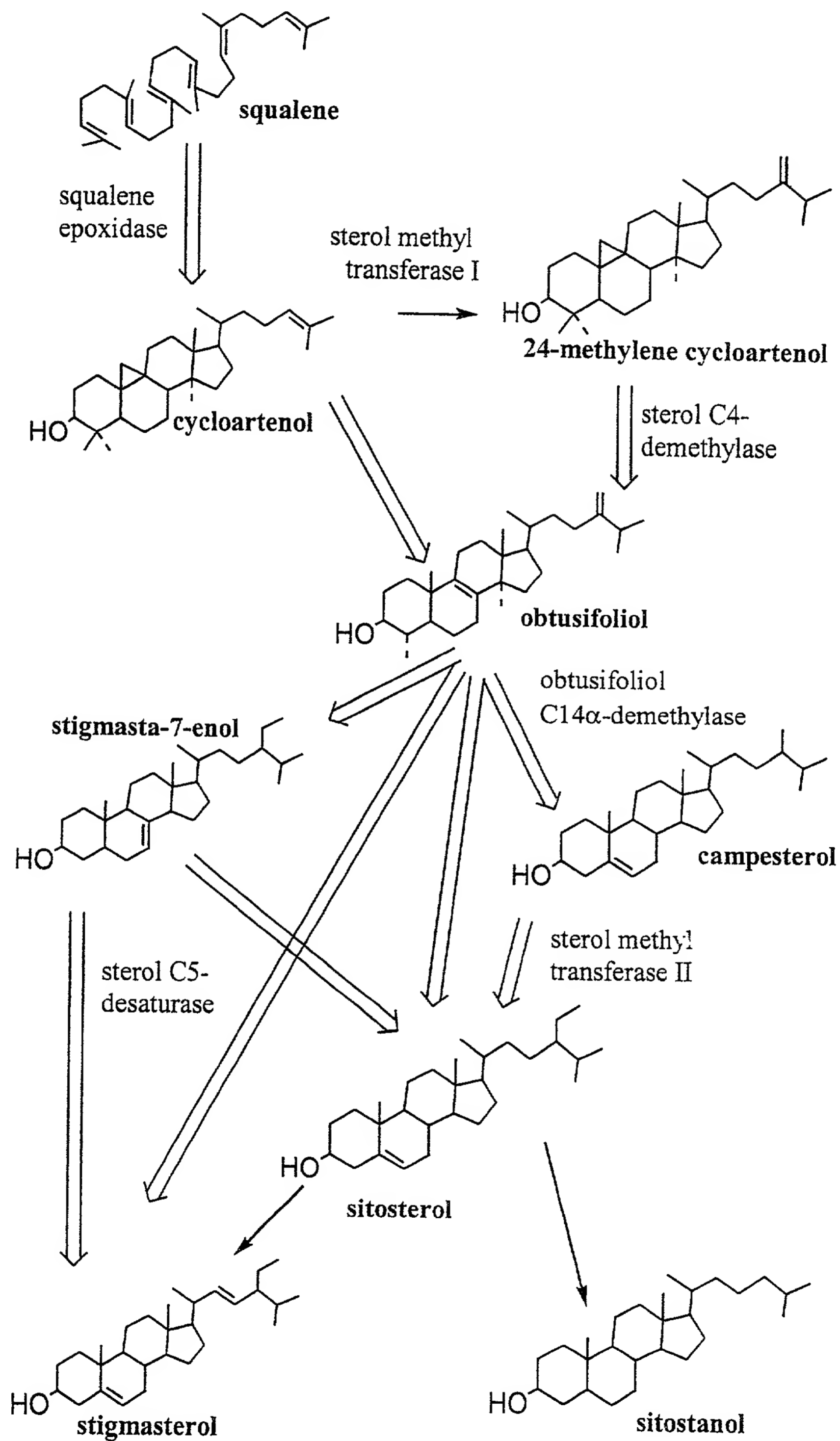


1/78

FIG. 1



2/78

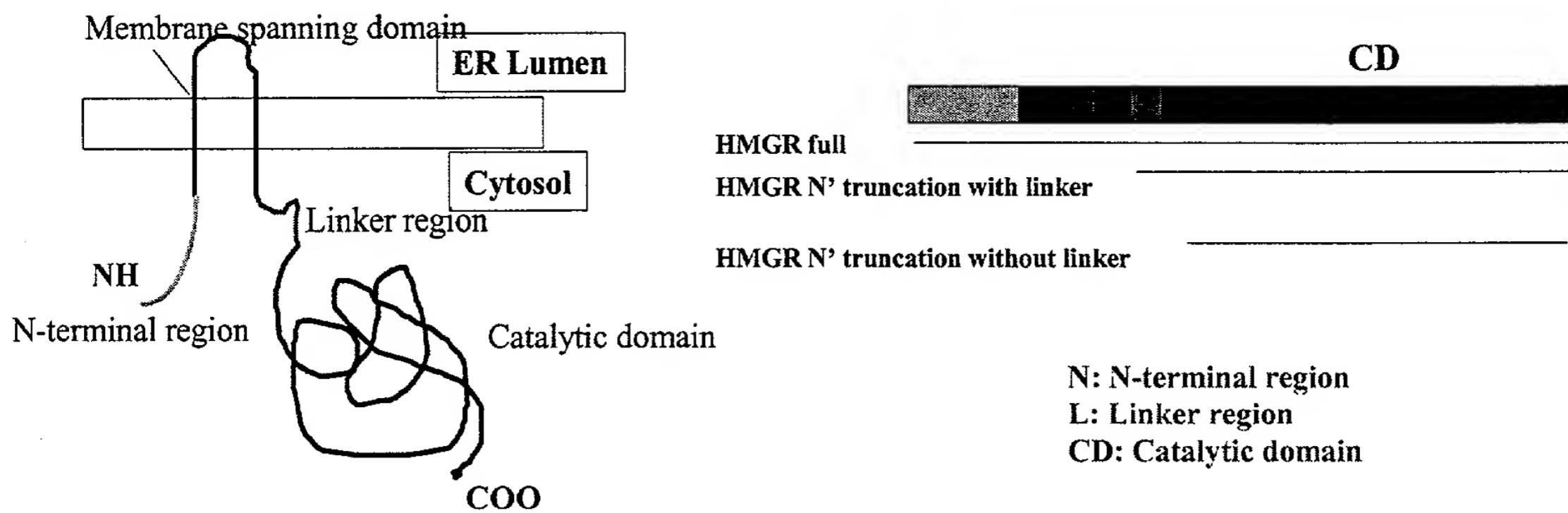


Figure 2: Forms of *Arabidopsis* and rubber HMGR1 tested in *Arabidopsis* and yeast to compare expression, activity and sterol production.

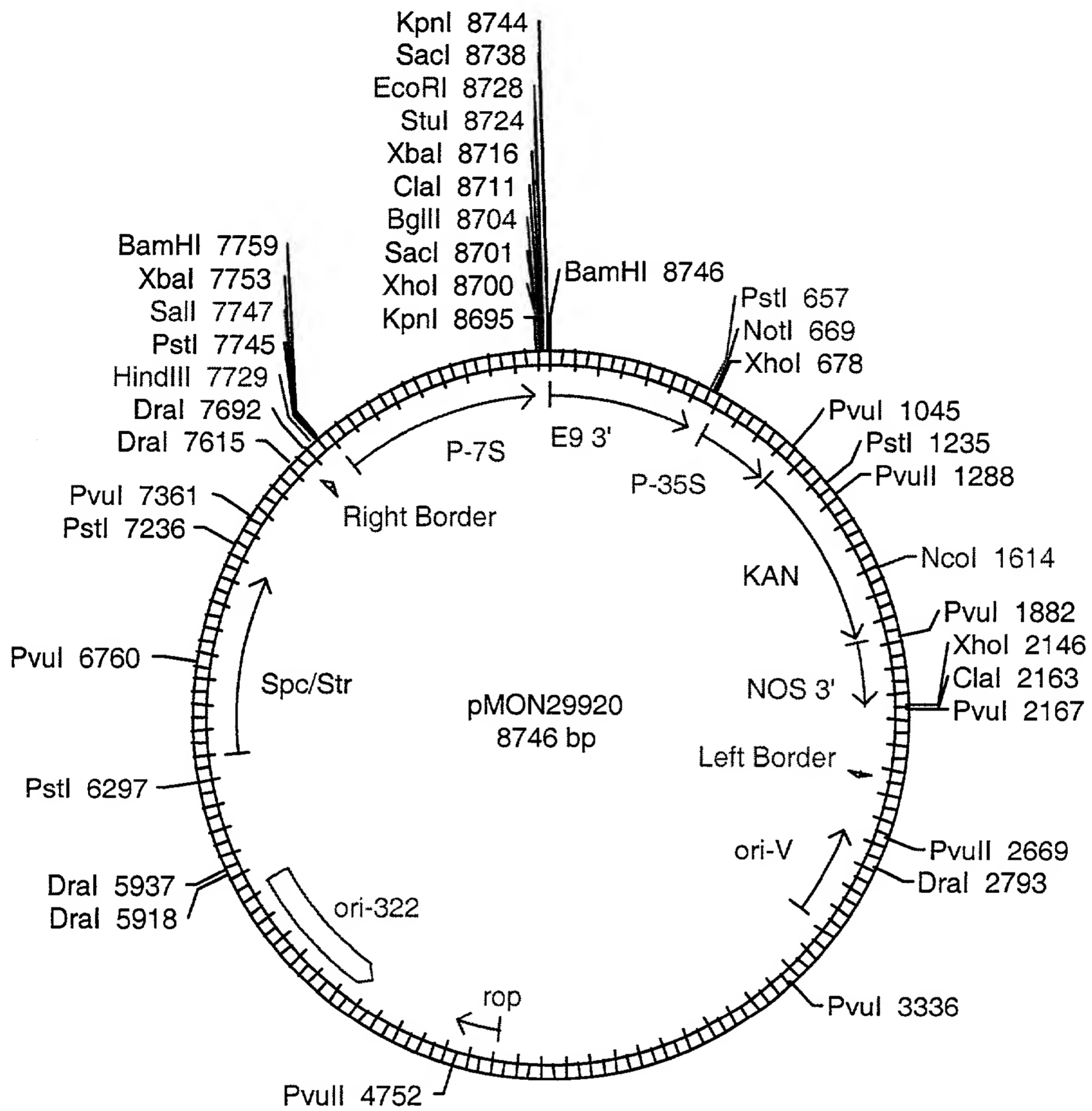


Figure 3: Construct pMON29920

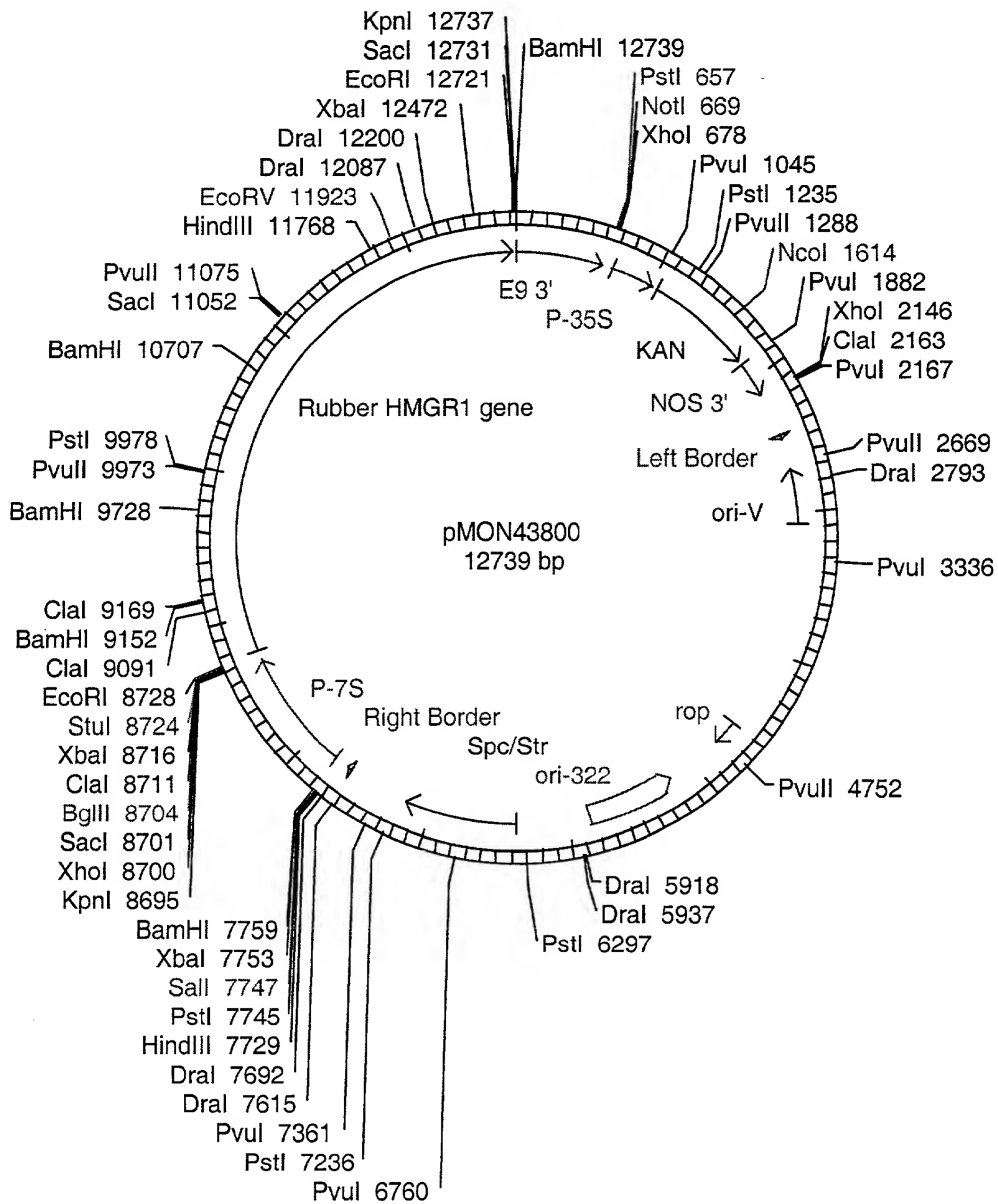


Figure 4: Construct pMON43800

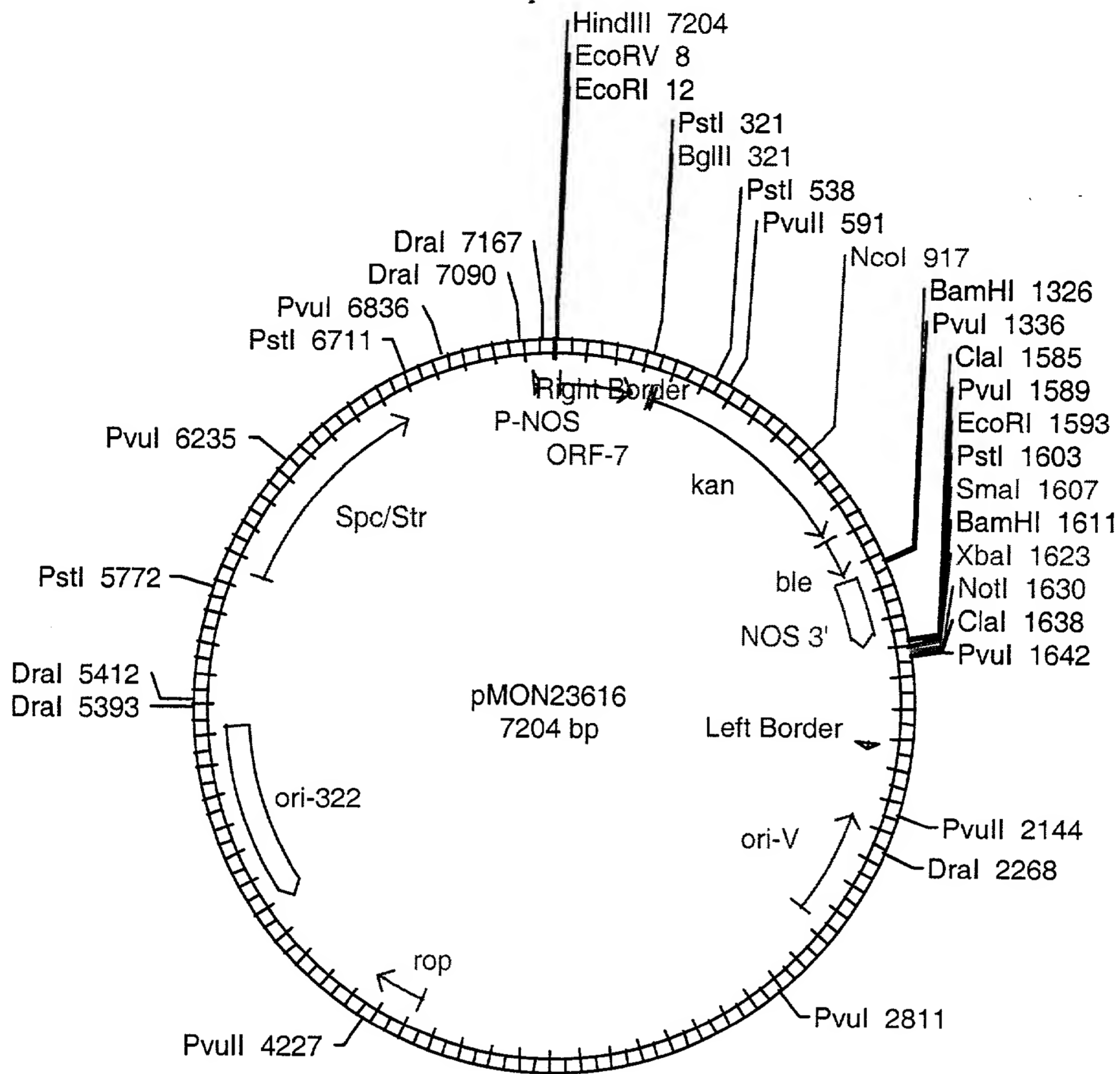


Figure 5: Construct pMON23616

6/78

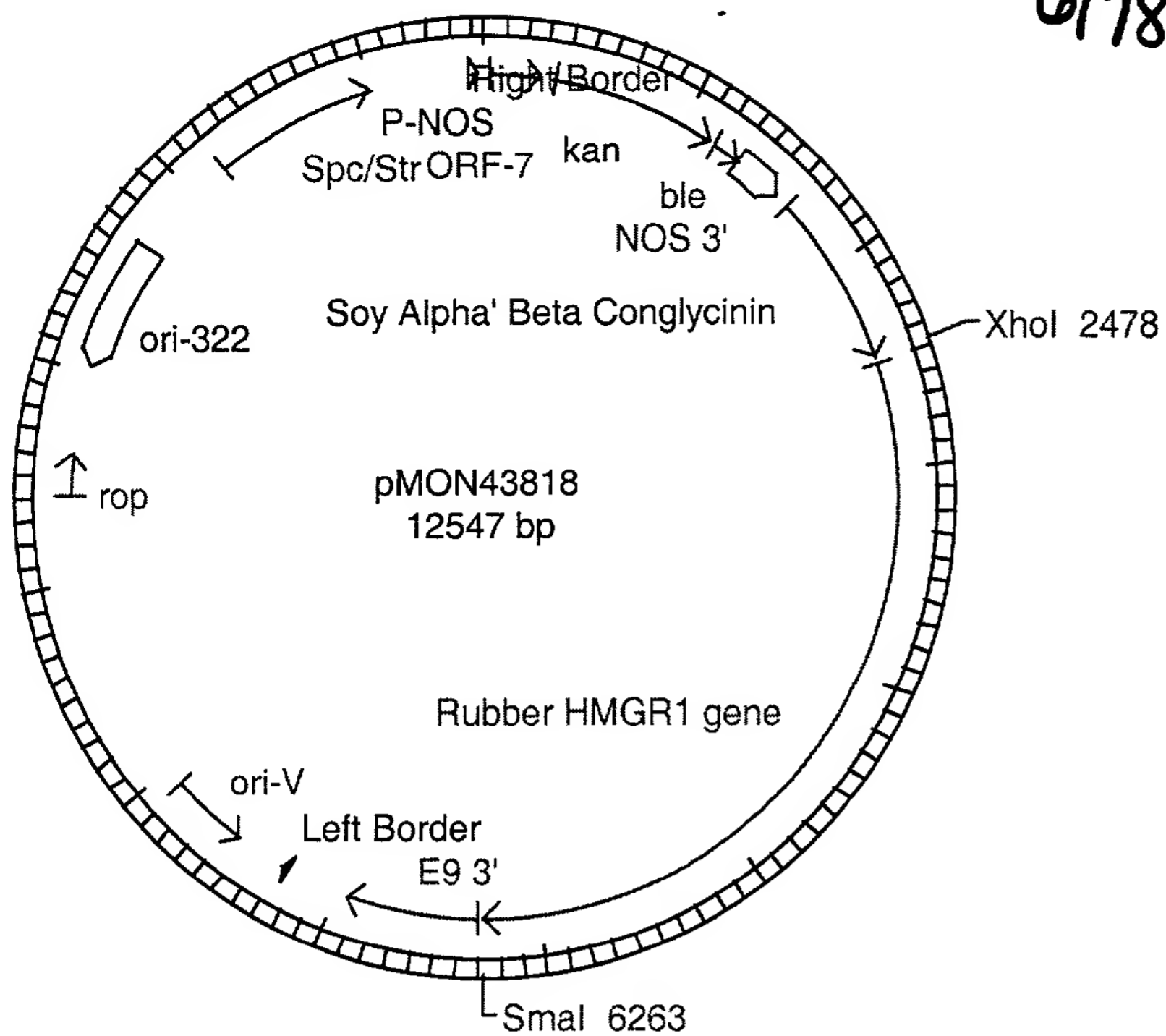


Figure 6: Construct pMON43818

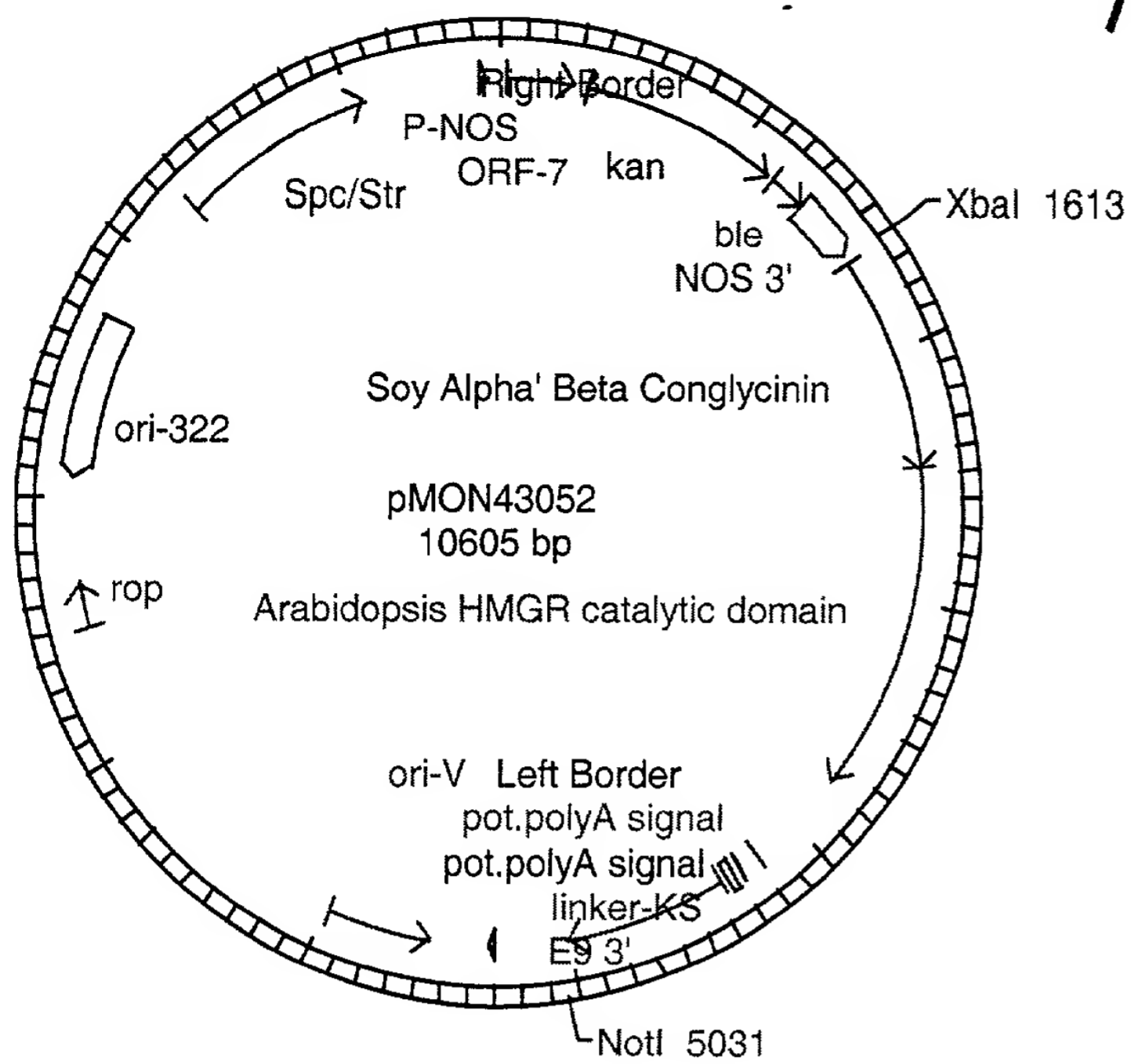


Figure 7: Construct pMON43052

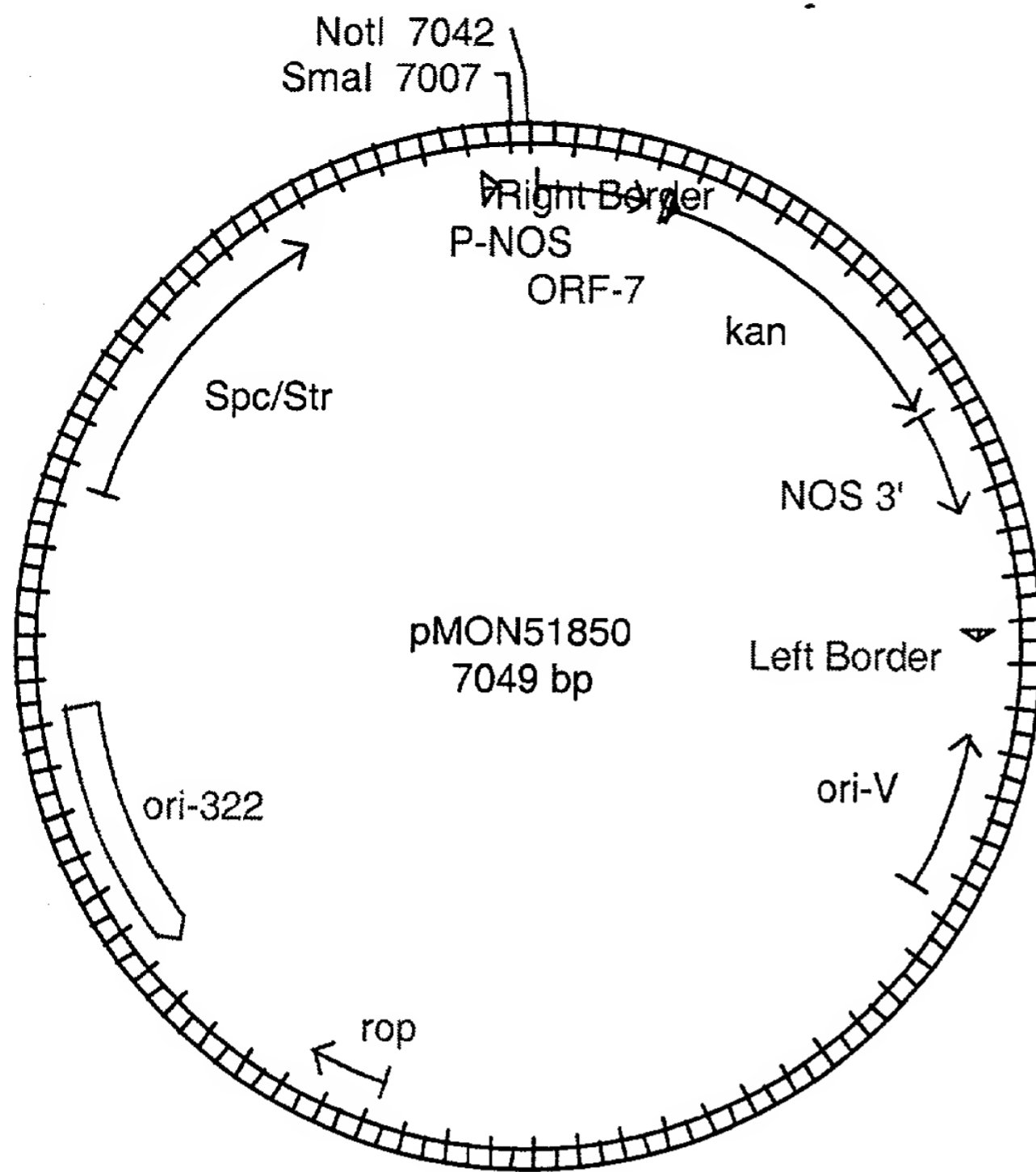


Figure 8: Construct pMON51850

9/78

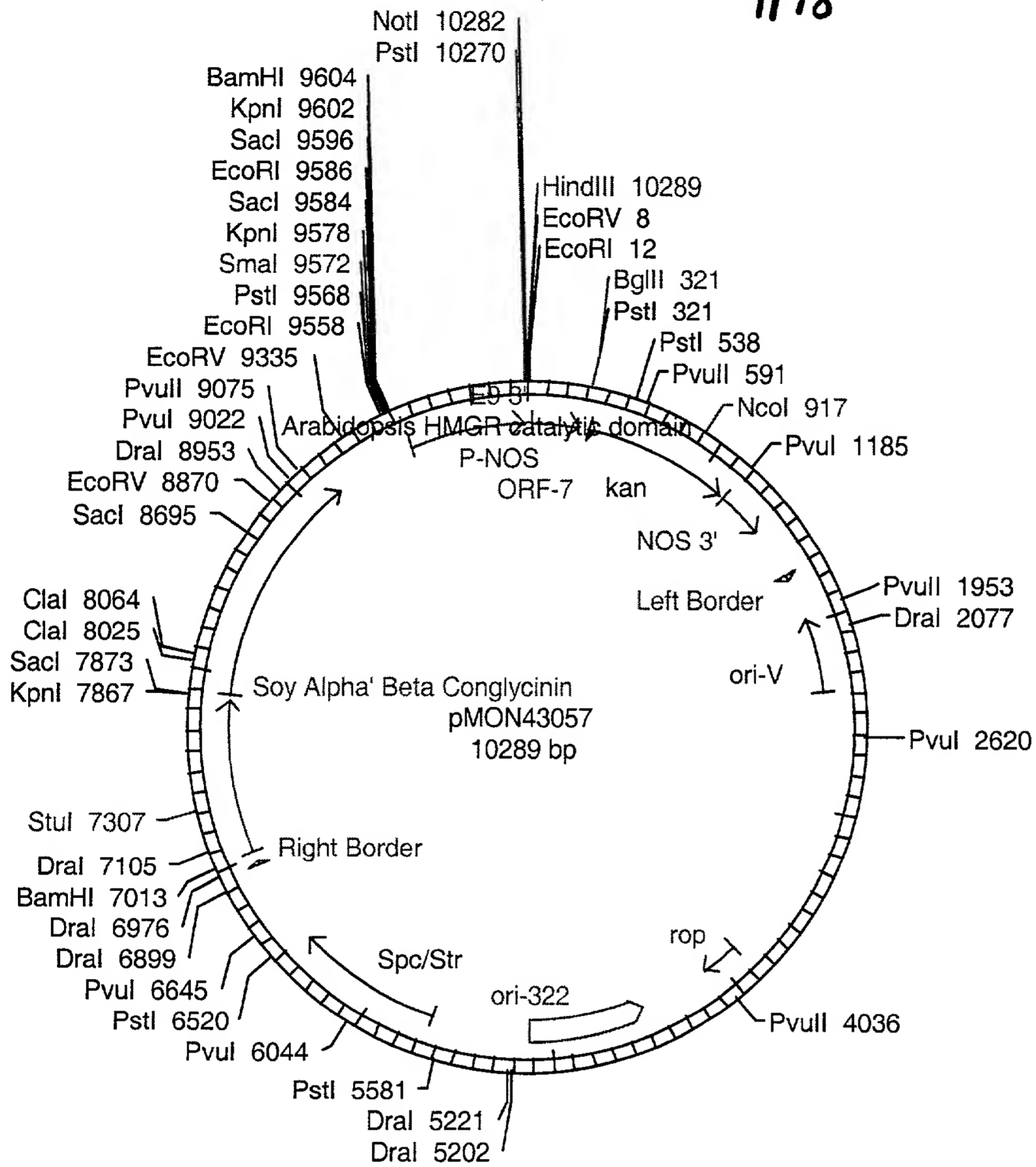


Figure 9: Construct pMON43057

10/78

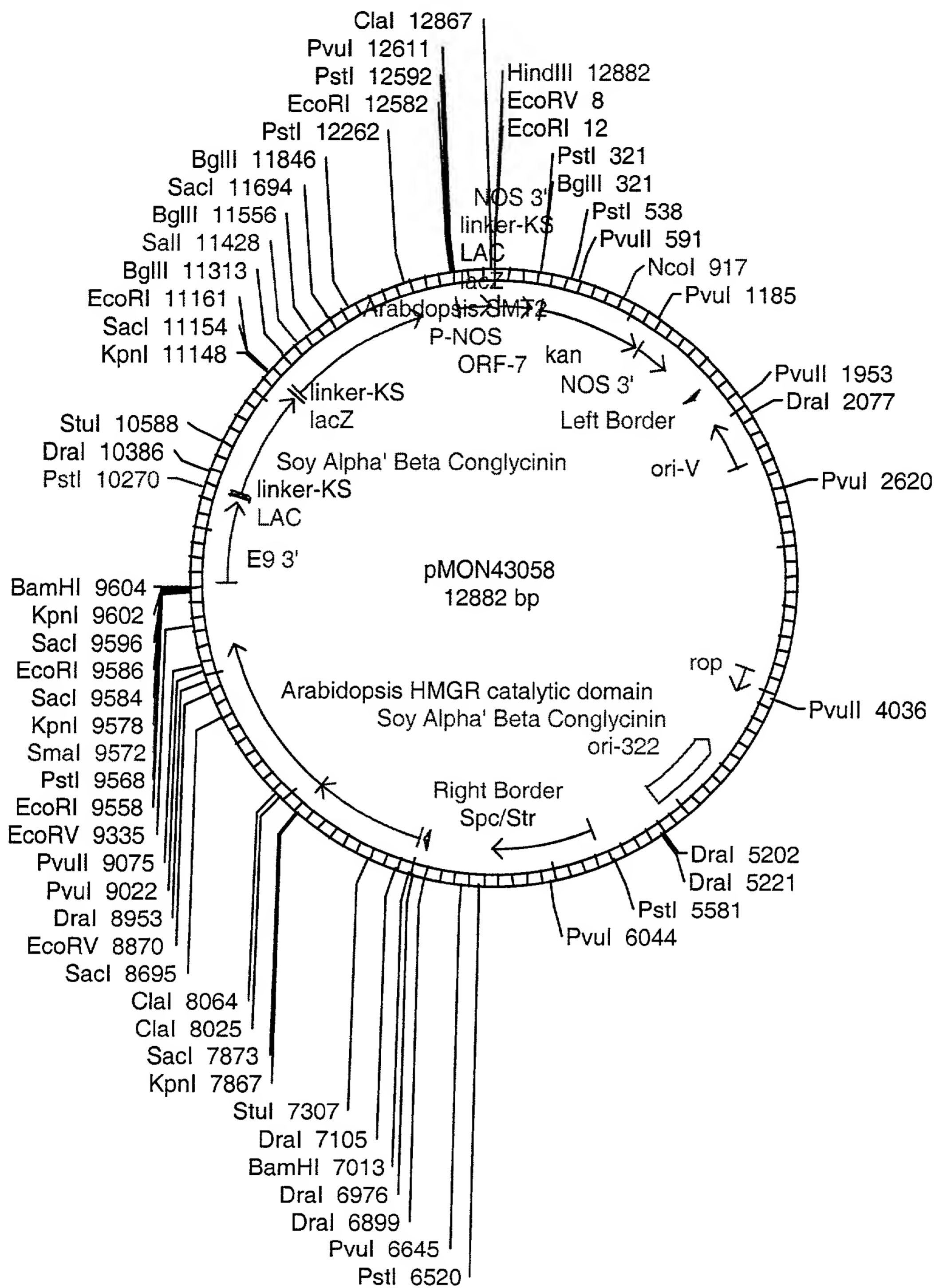


Figure 10: Construct pMON43058

11/78

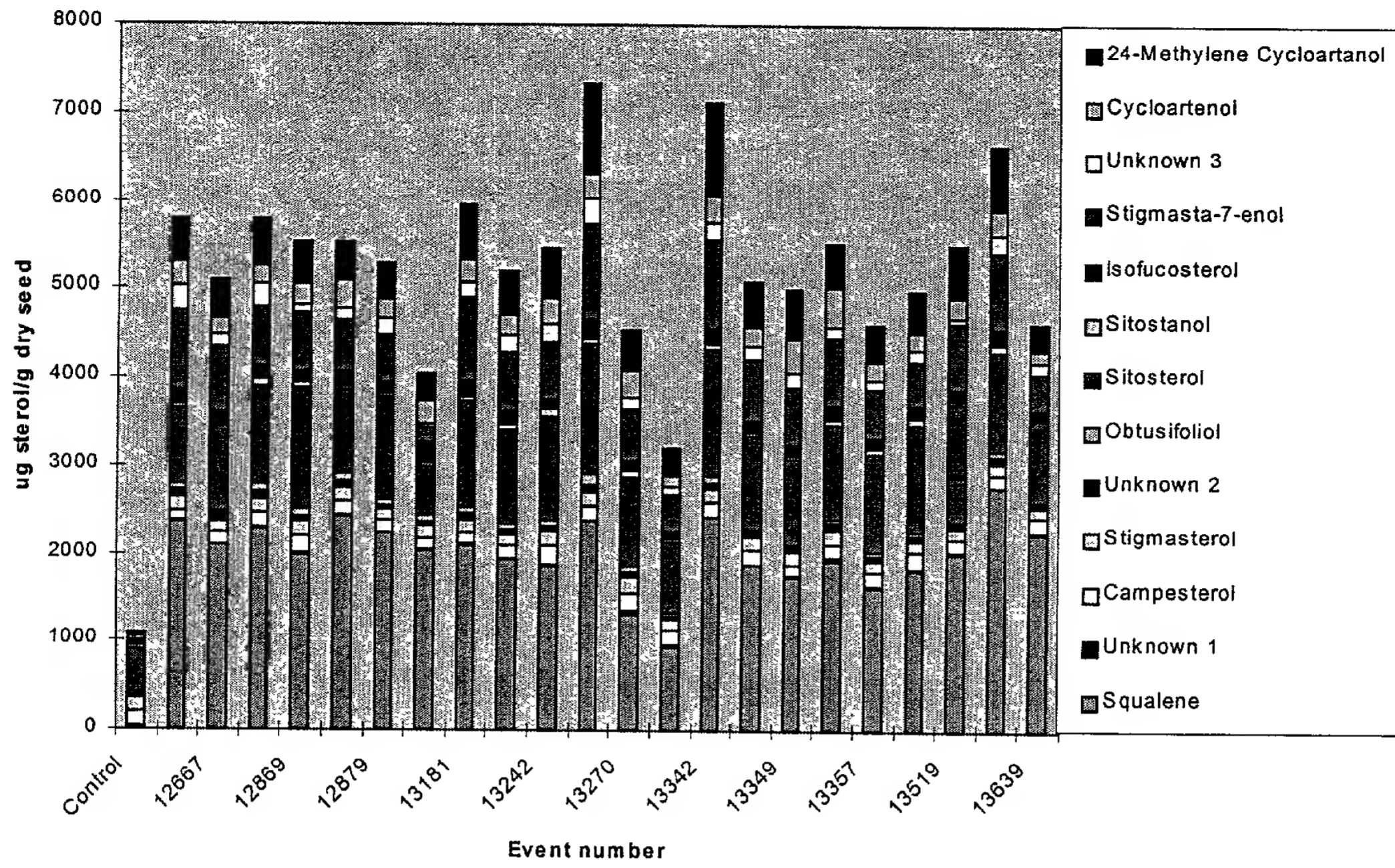


Figure 11: Sterol composition of R1 transgenic soybean seeds when *Arabidopsis* truncated HMGR (catalytic domain without linker) was overexpressed using seed-specific 7S promoter (data from pMON43057: p7s::*At* HMGR truncated).

12/78

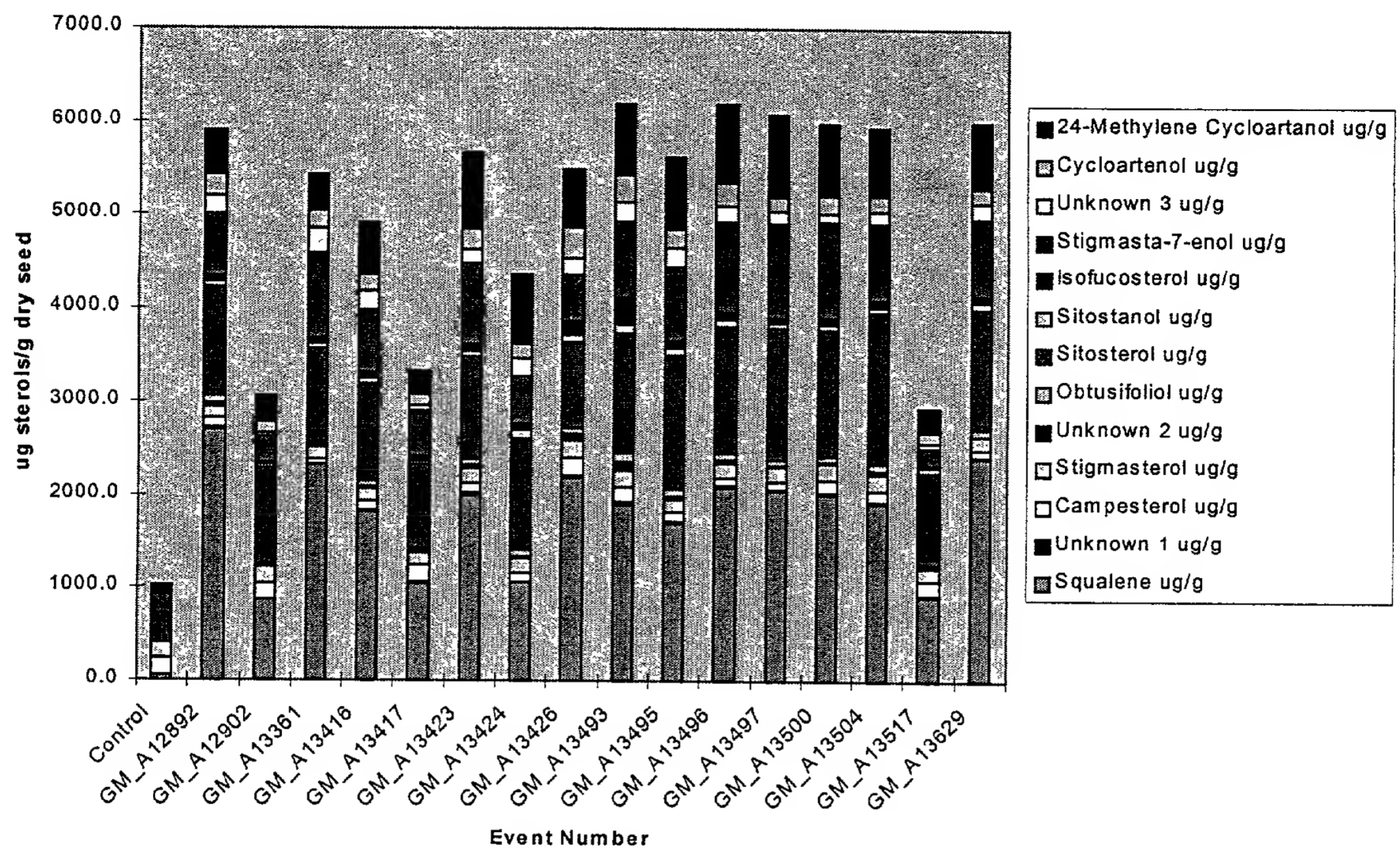


Figure 12: Sterol composition of R1 transgenic soybean seeds when *Arabidopsis* truncated HMGR (catalytic domain without linker) and *Arabidopsis* SMTII were overexpressed (data from pMON43058: p7S::At HMGR truncated & p7S::At SMTII). The expression of the genes is controlled by the seed-specific 7S promoter.

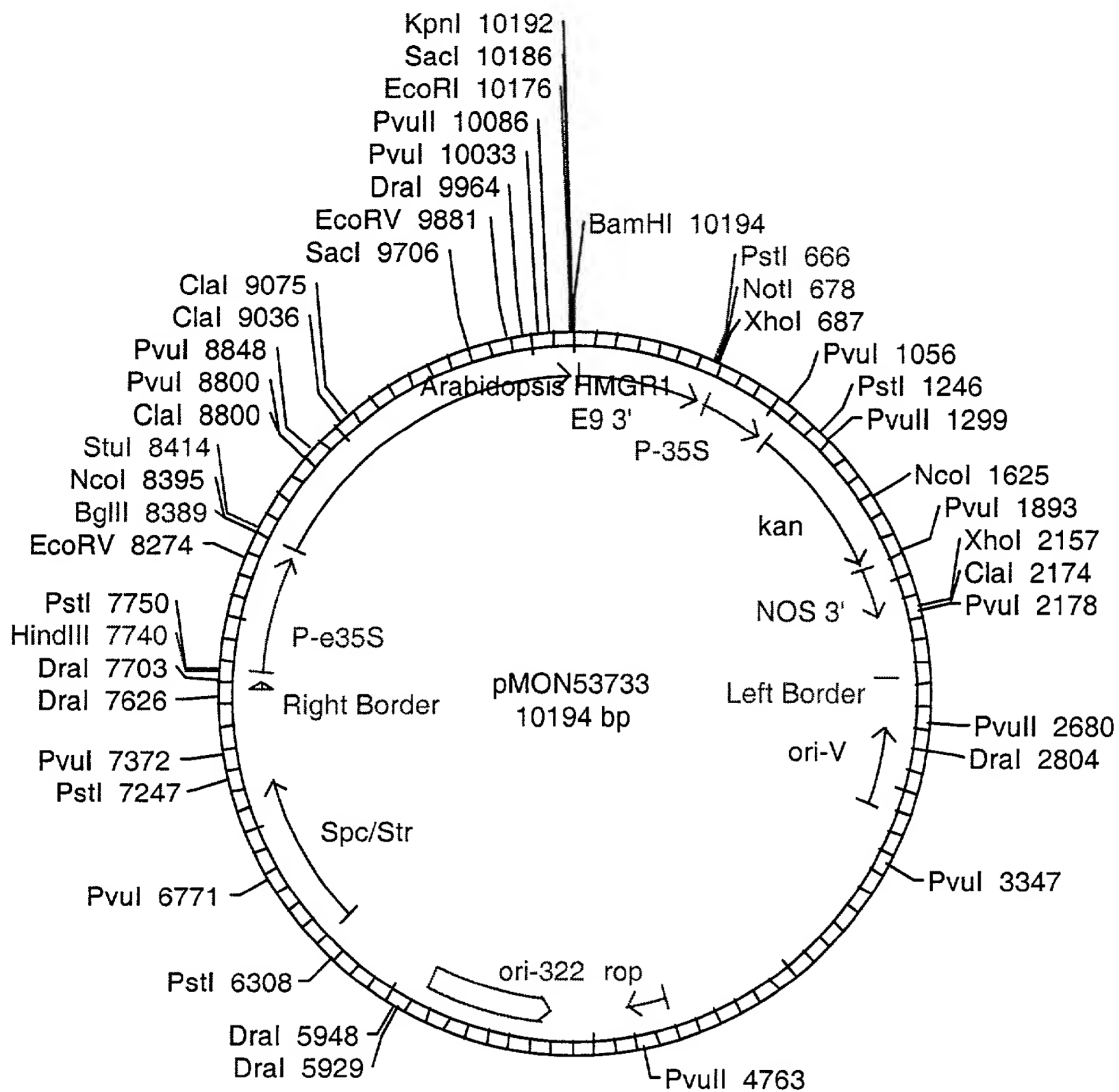


Figure 13: Construct pMON53733

14/78

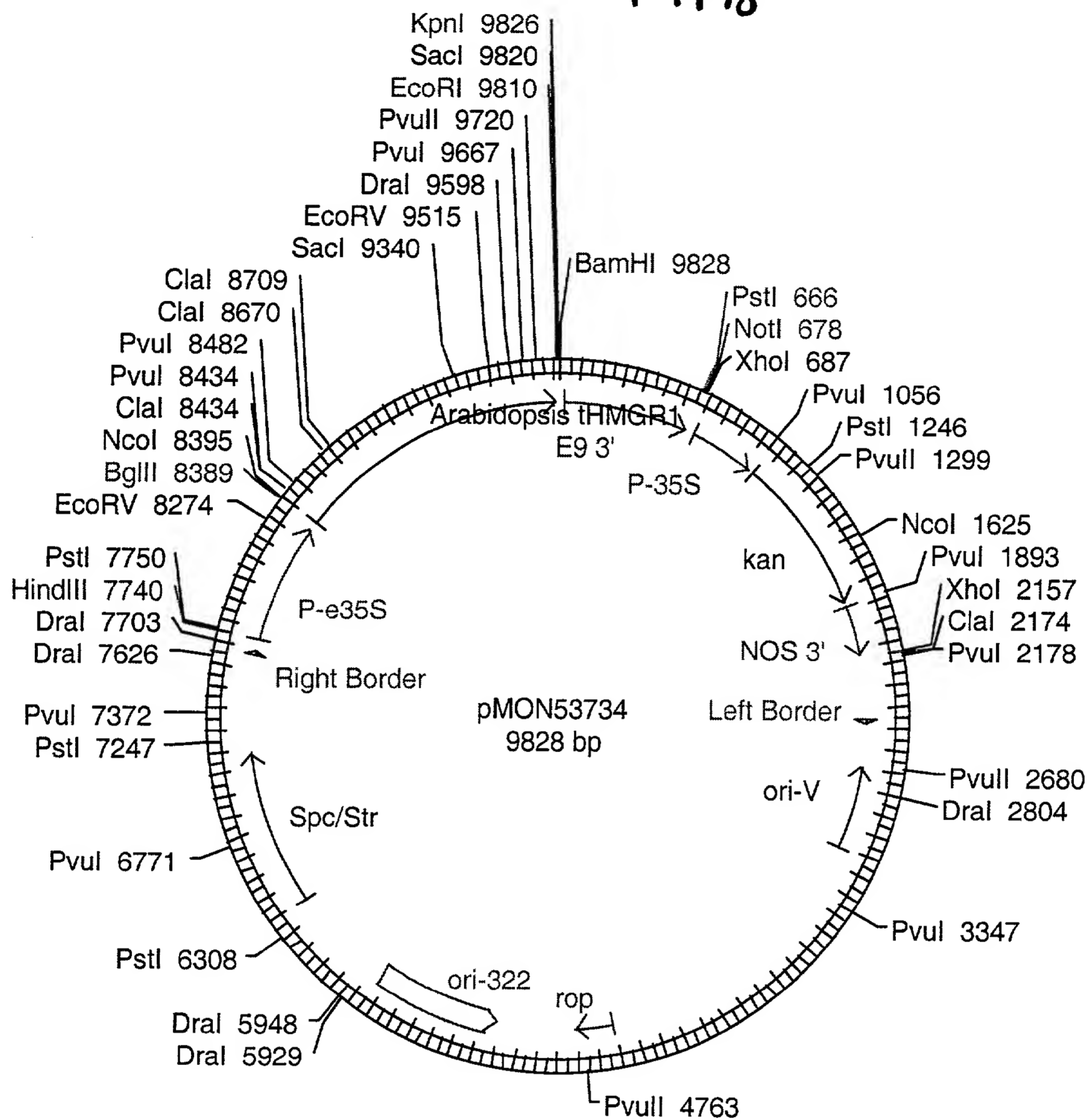


Figure 14: Construct pMON53734

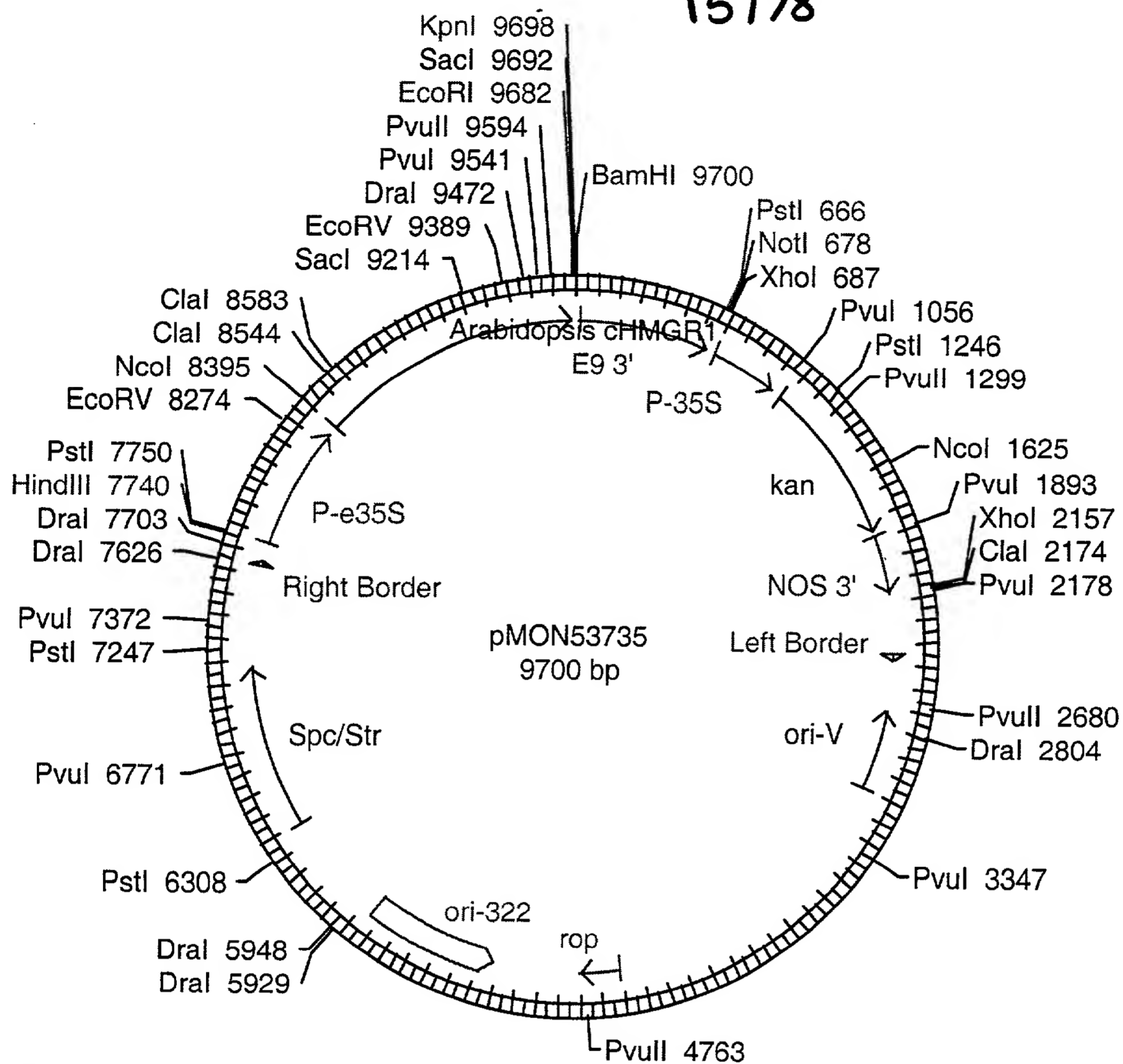


Figure 15: Construct pMON53735

16178

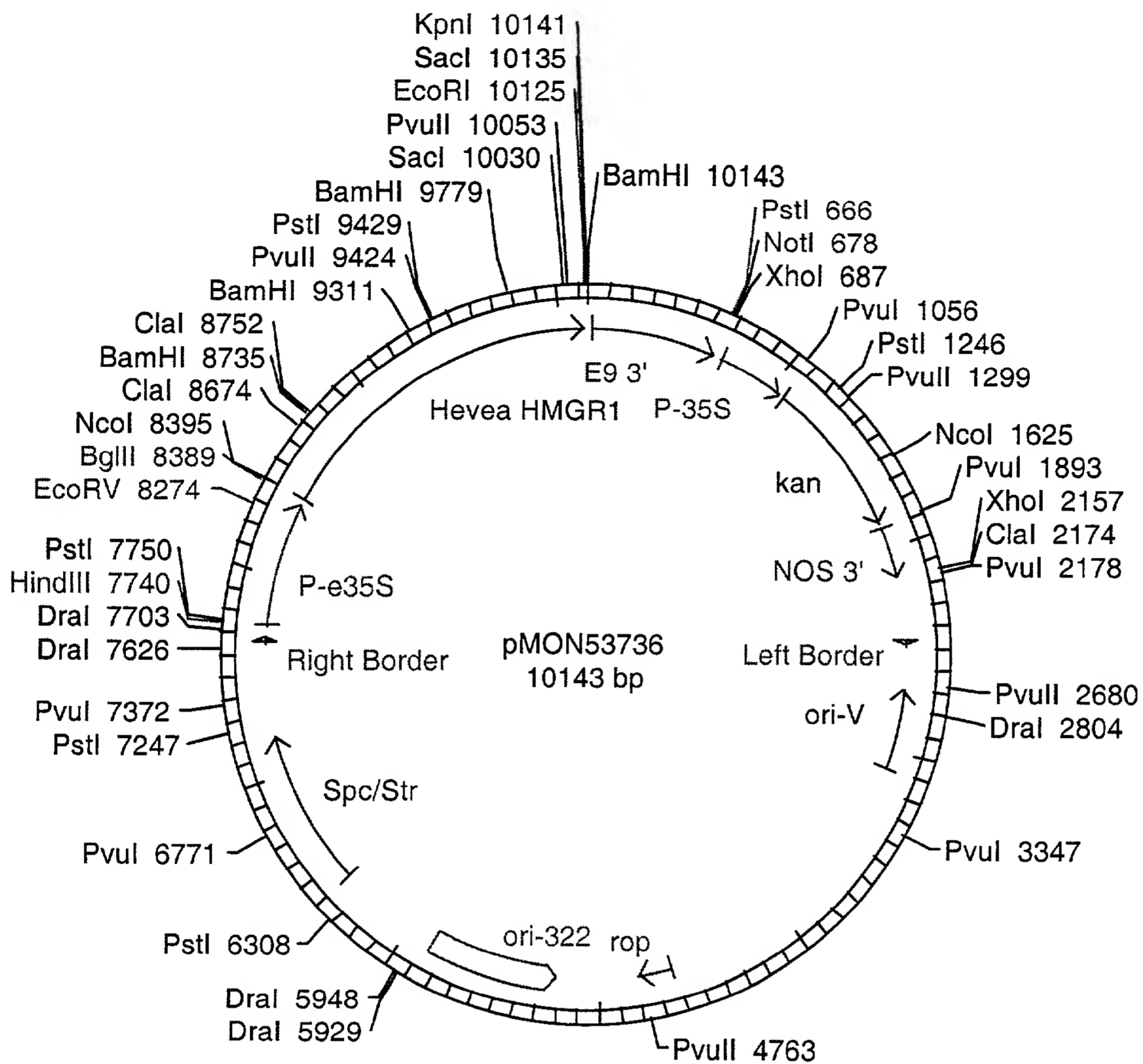


Figure 16: Construct pMON53736

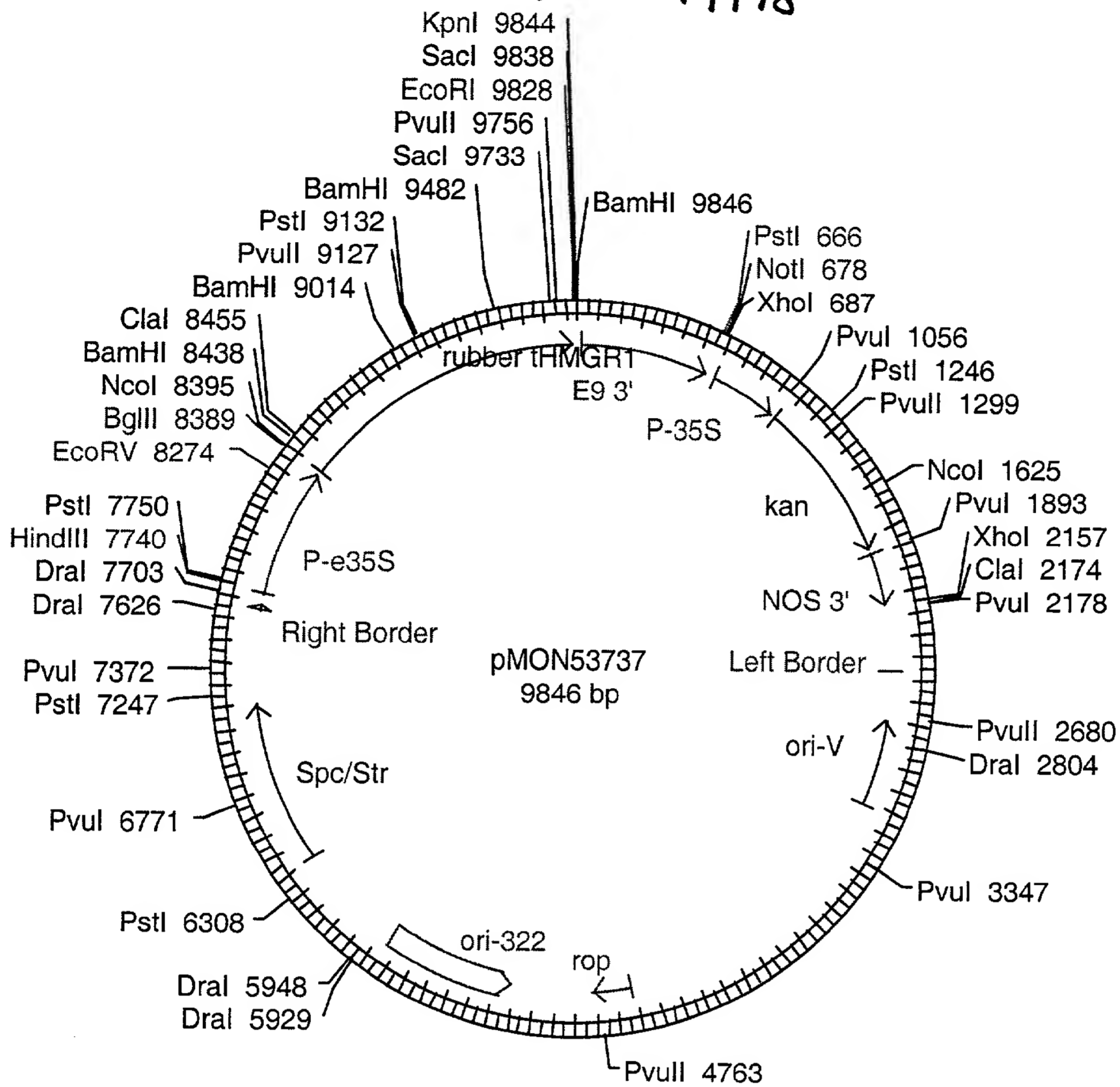


Figure 17: Construct pMON53737

18/78

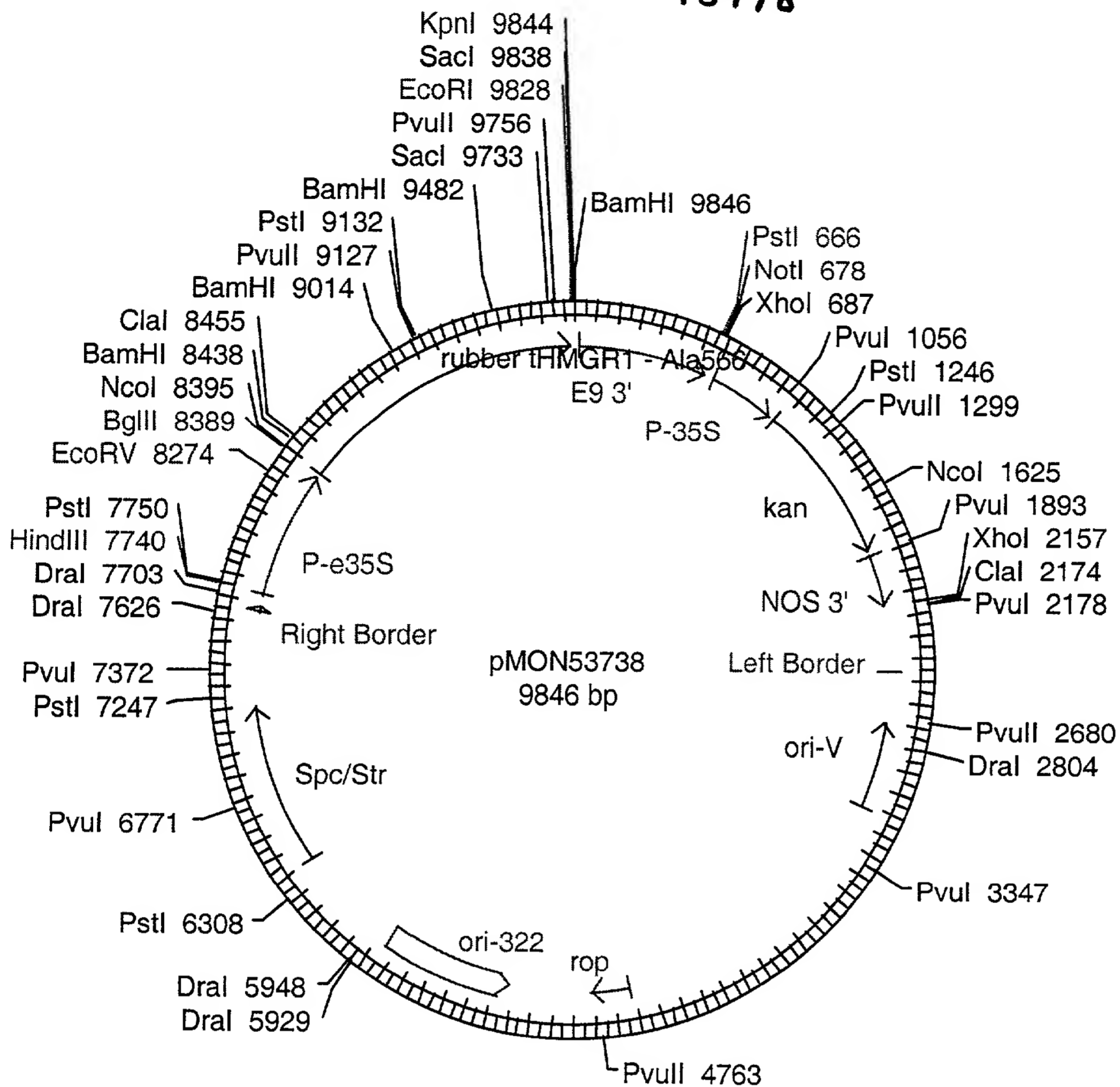


Figure 18: Construct pMON53738

19/78

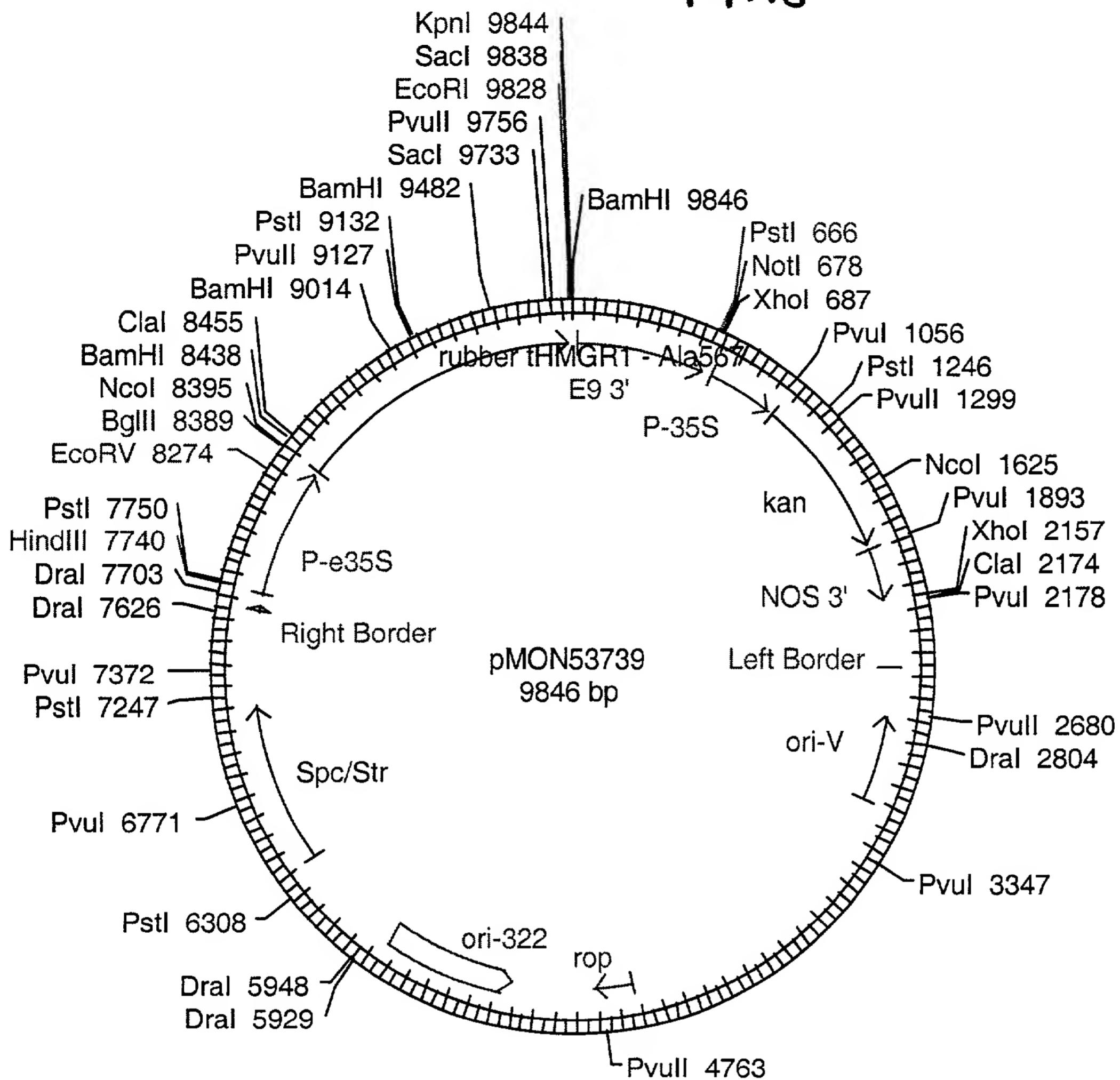


Figure 19: Construct pMON53739

20/78

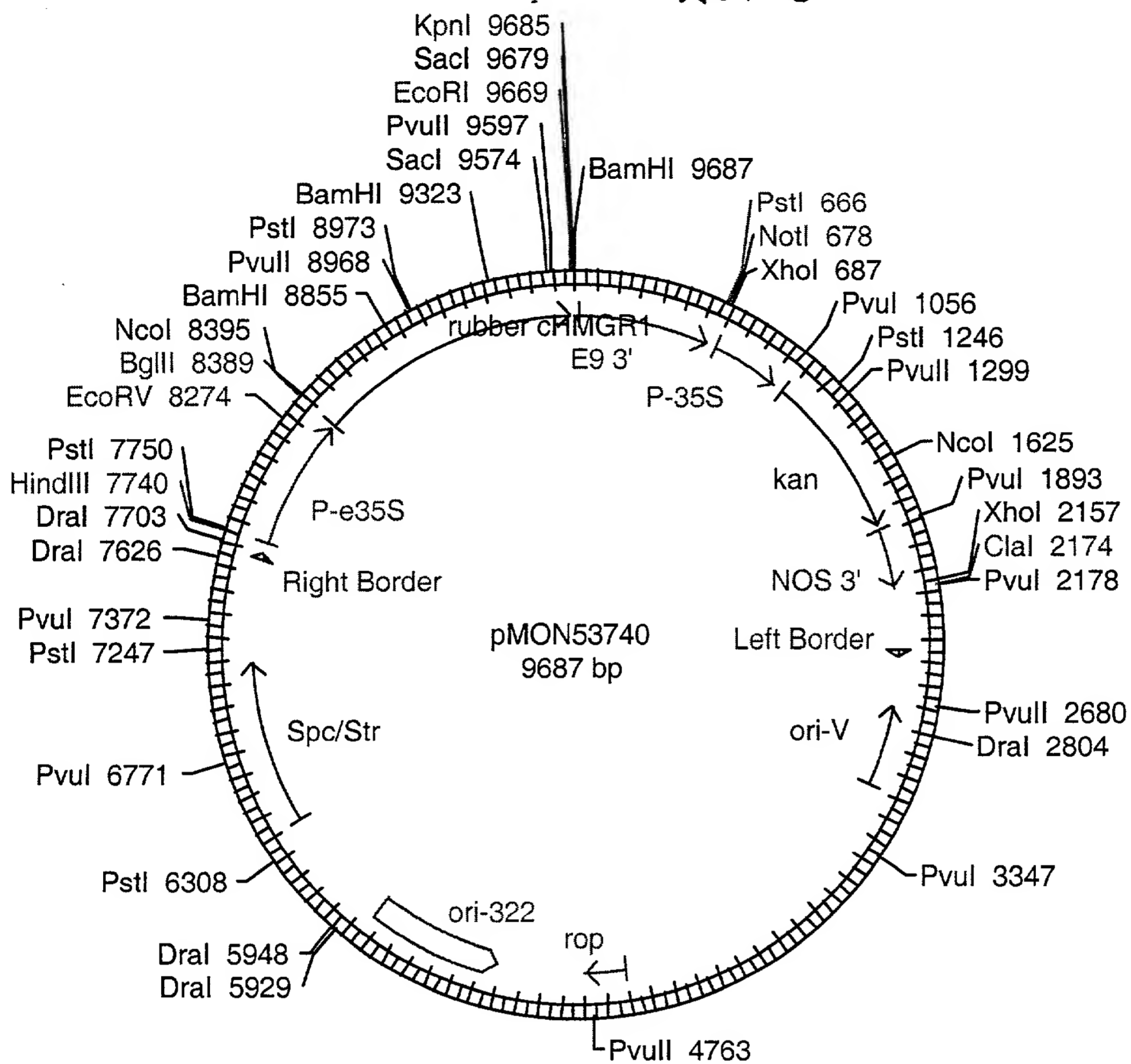


Figure 20: Construct pMON53740

Comparison of Cycloartenol Levels in Transgenic Plants

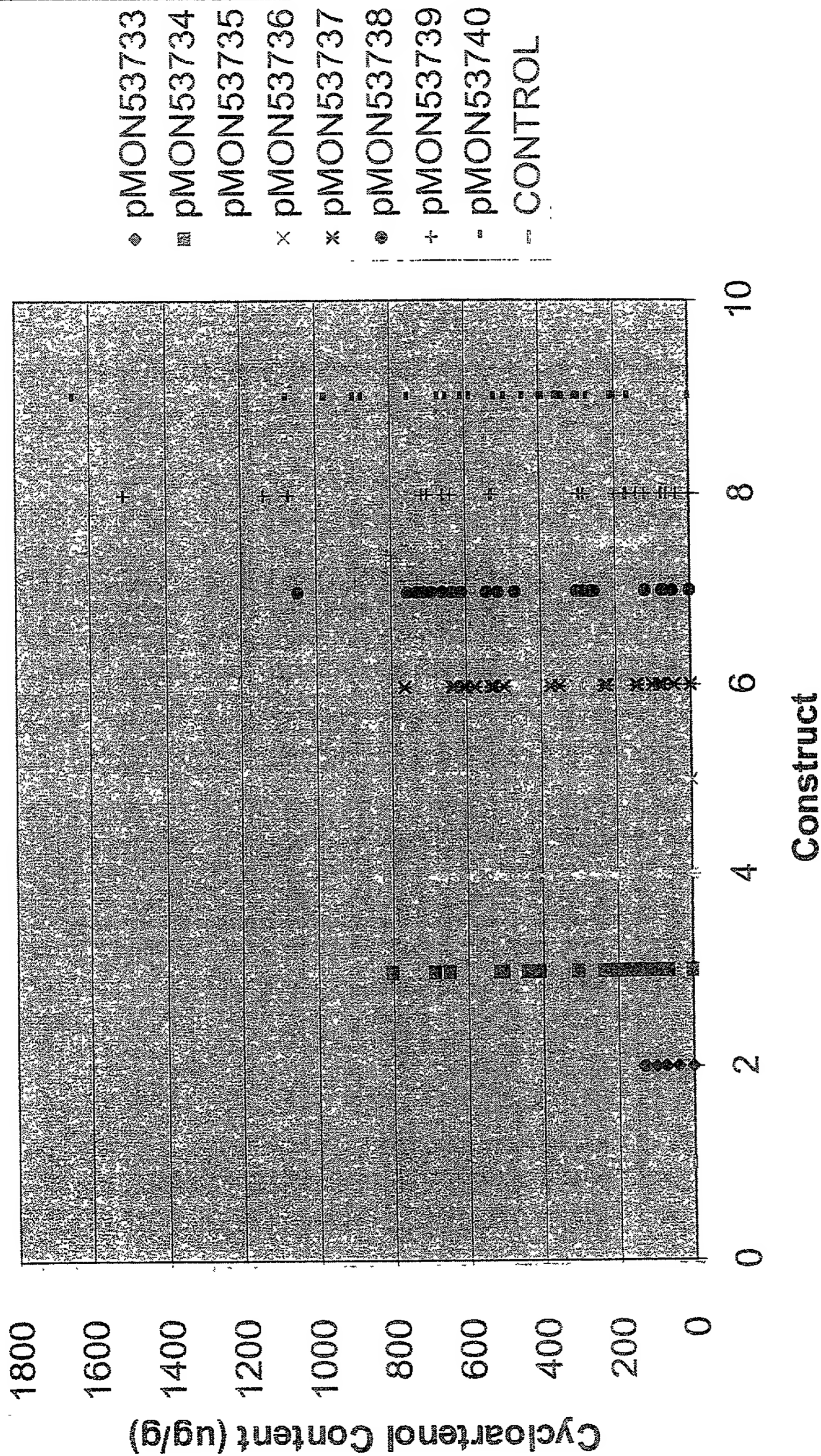


FIGURE 21

22/78

Comparison of 24-Methylene Cycloartenol in Transgenic Plants

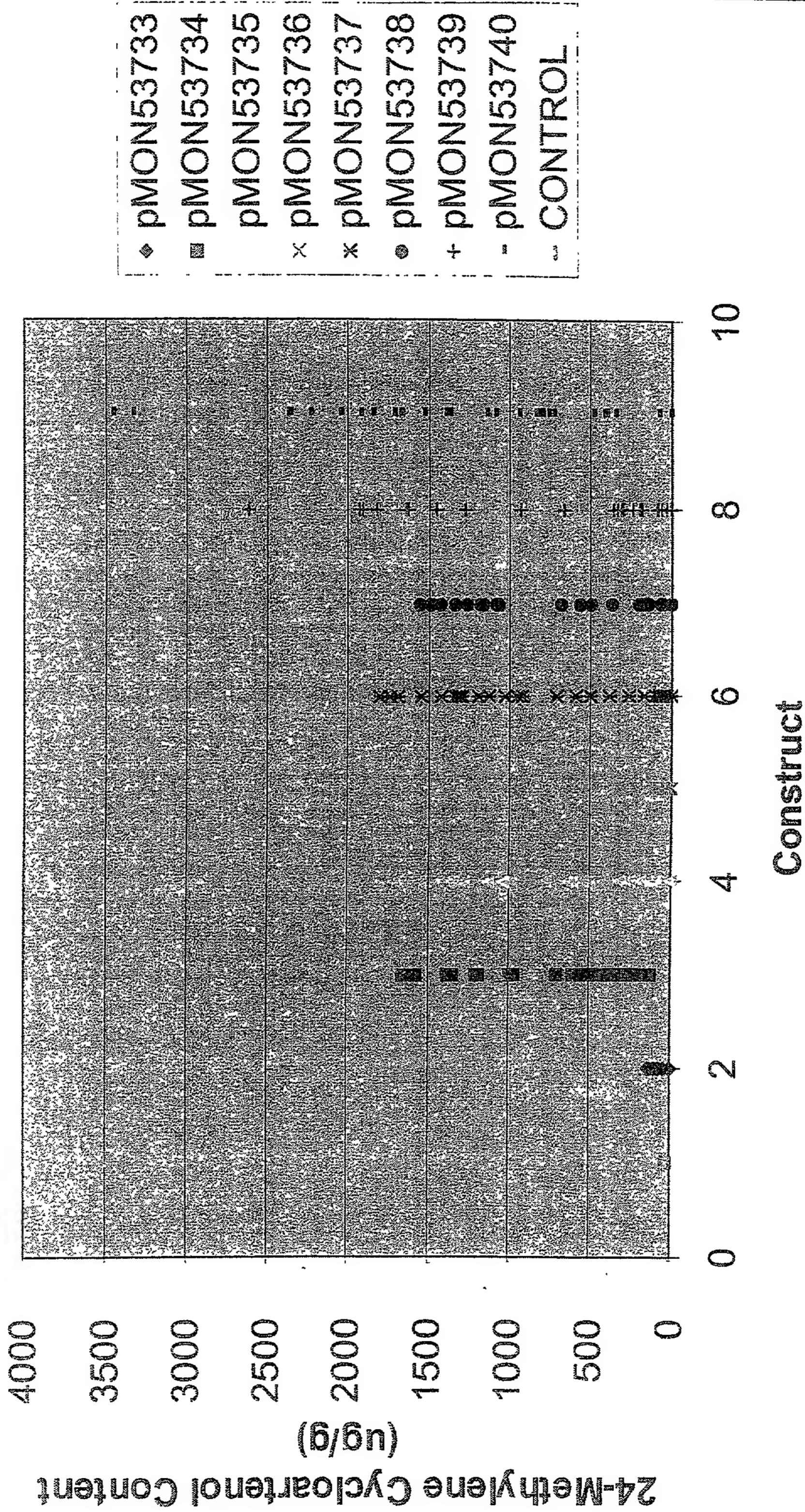


FIGURE 22

Comparison of Obtusifolios Levels in Transgenic Plants

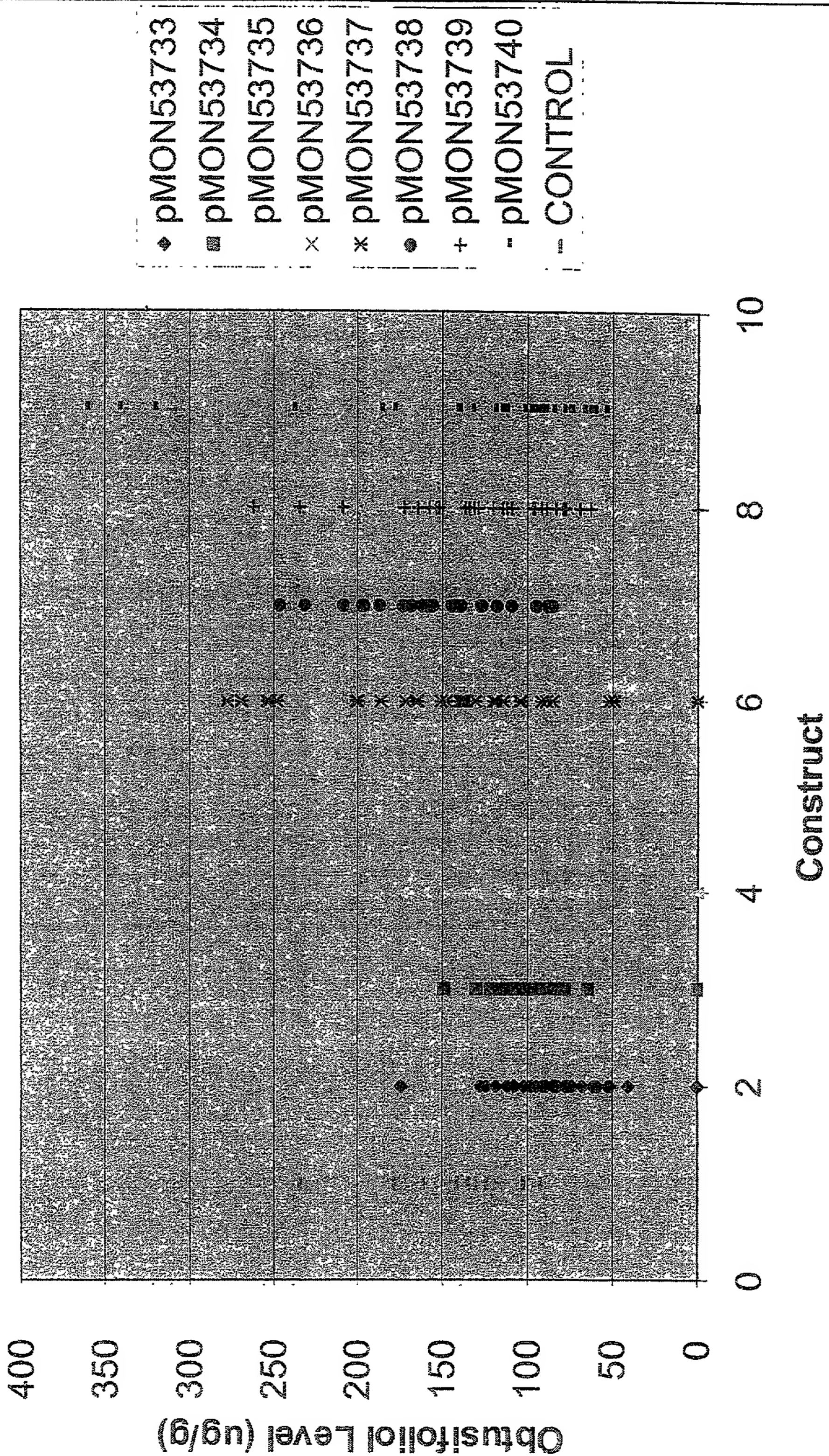


FIGURE 23

Comparison of Campesterol Levels in Transgenic Plants

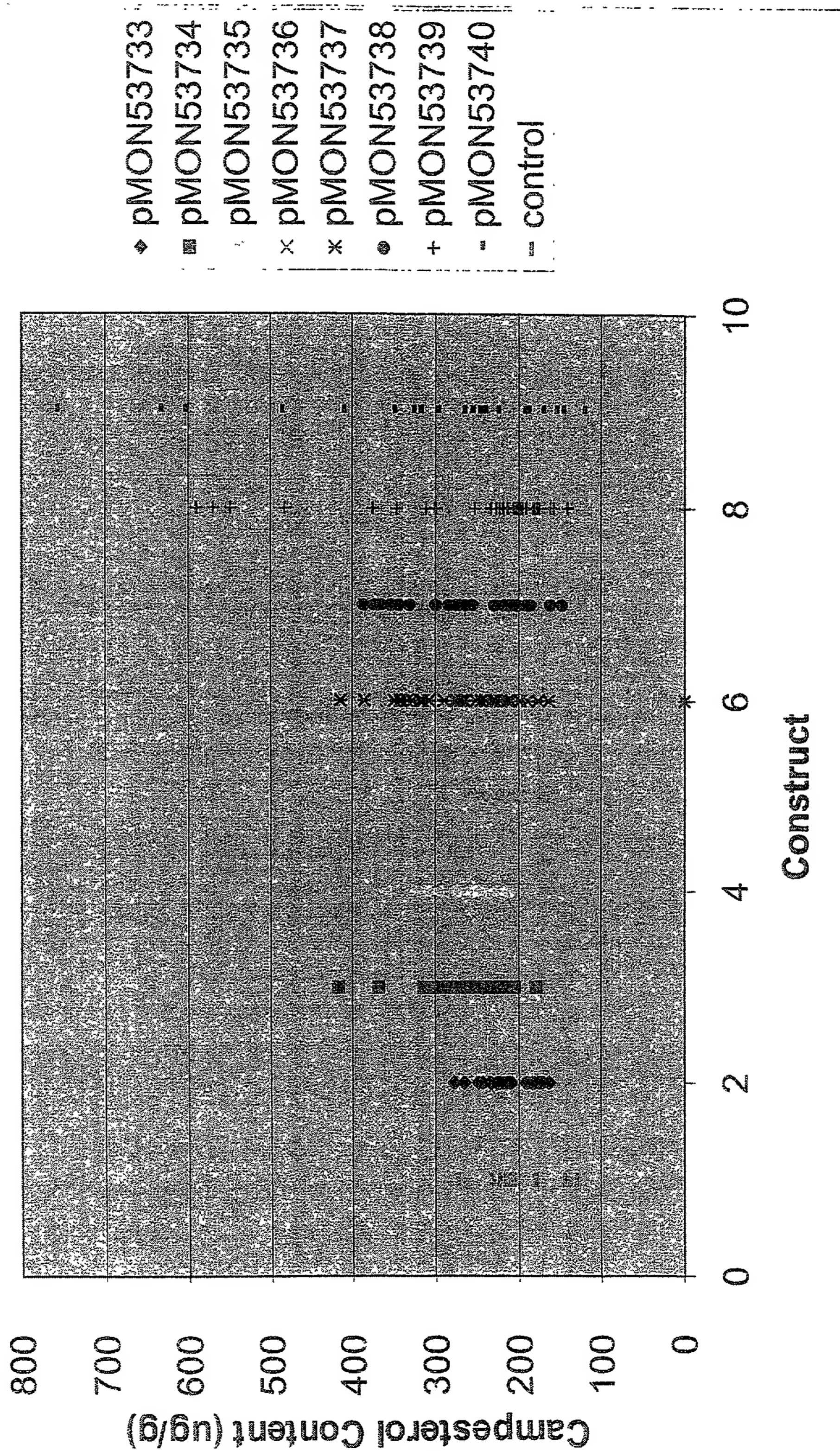


FIGURE 24

Comparison of Sitosterol Levels in Transgenic Plants

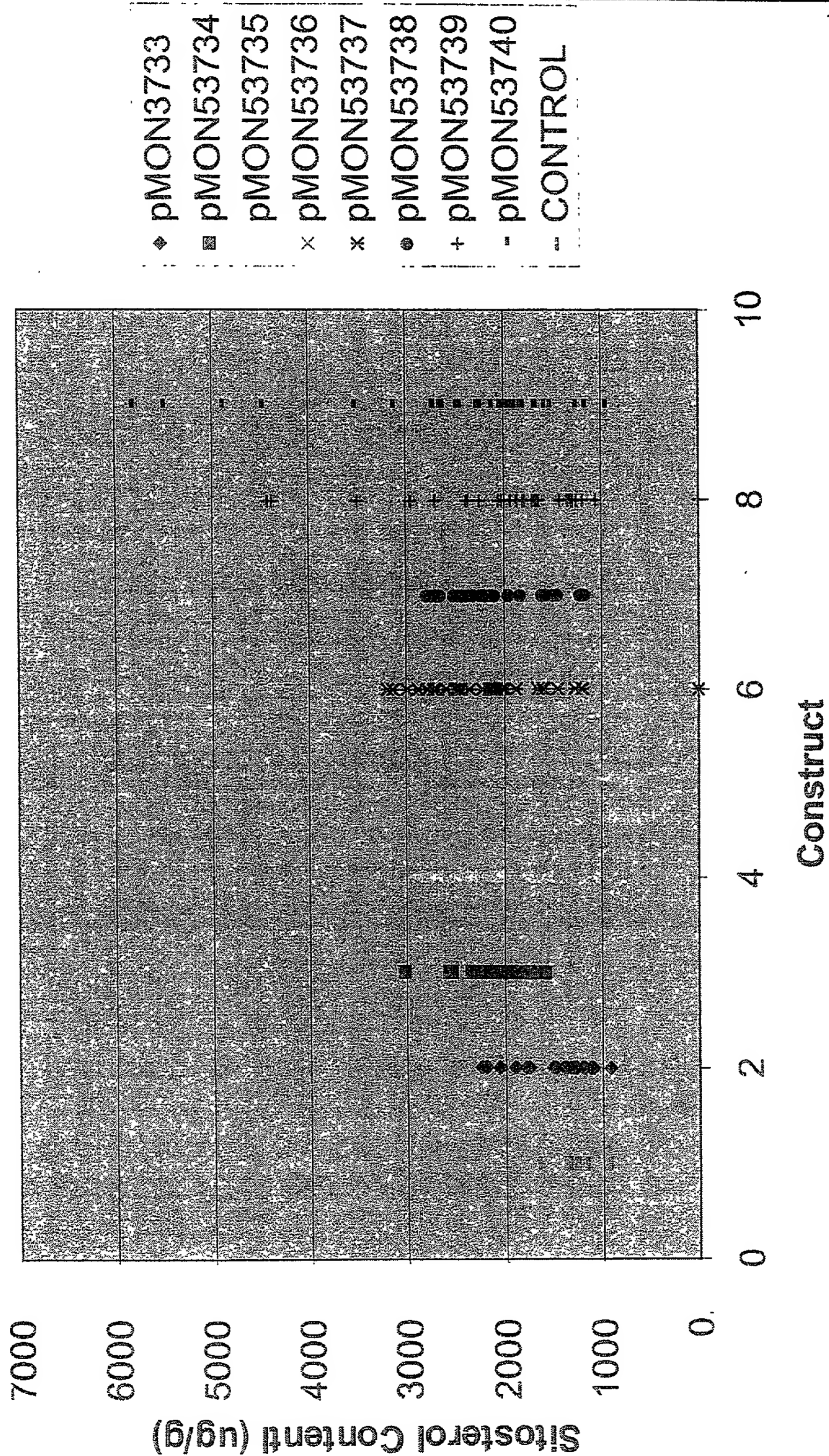
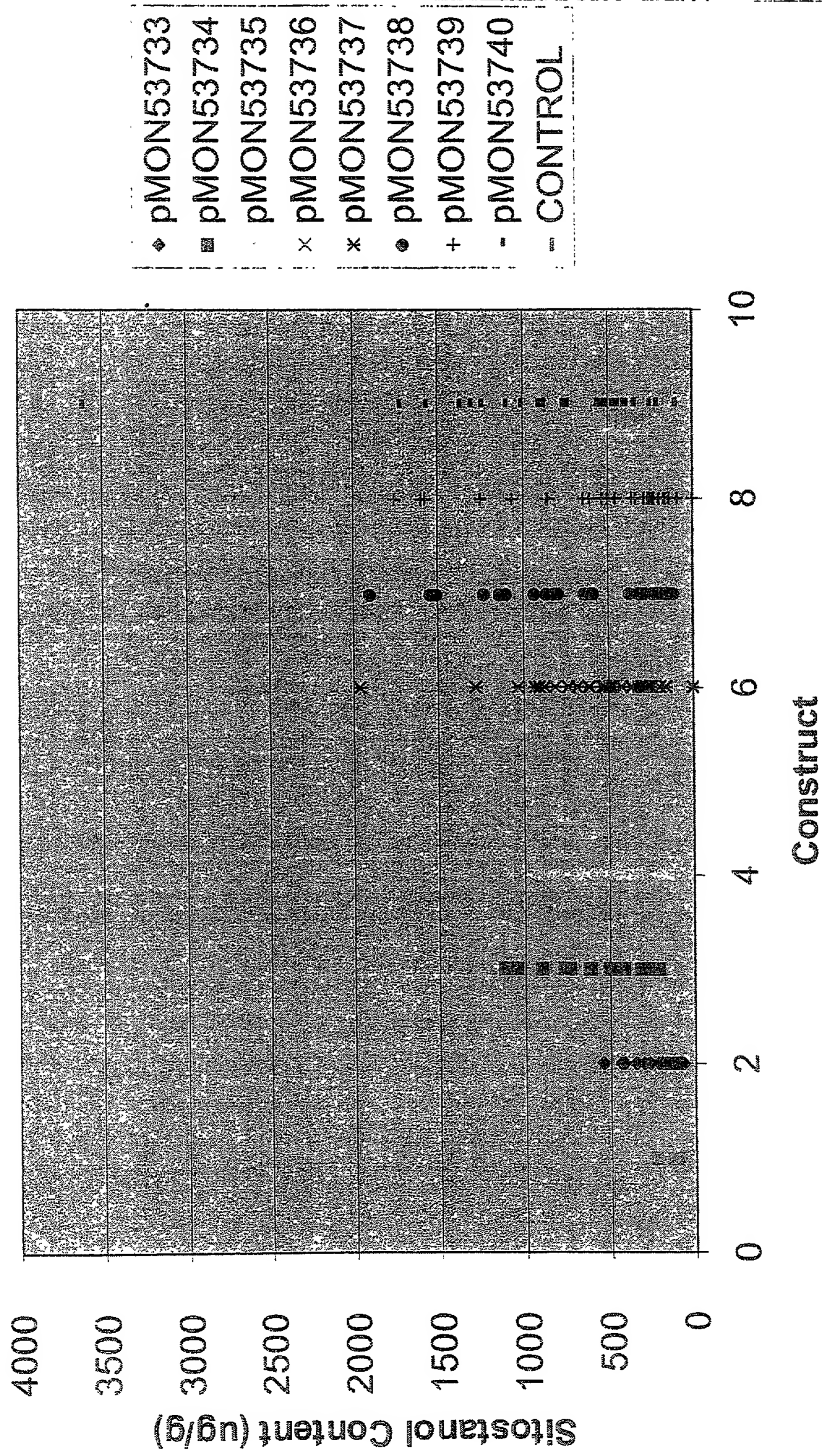


FIGURE 25

Comparison of Sitostanol Levels in Transgenic Plants



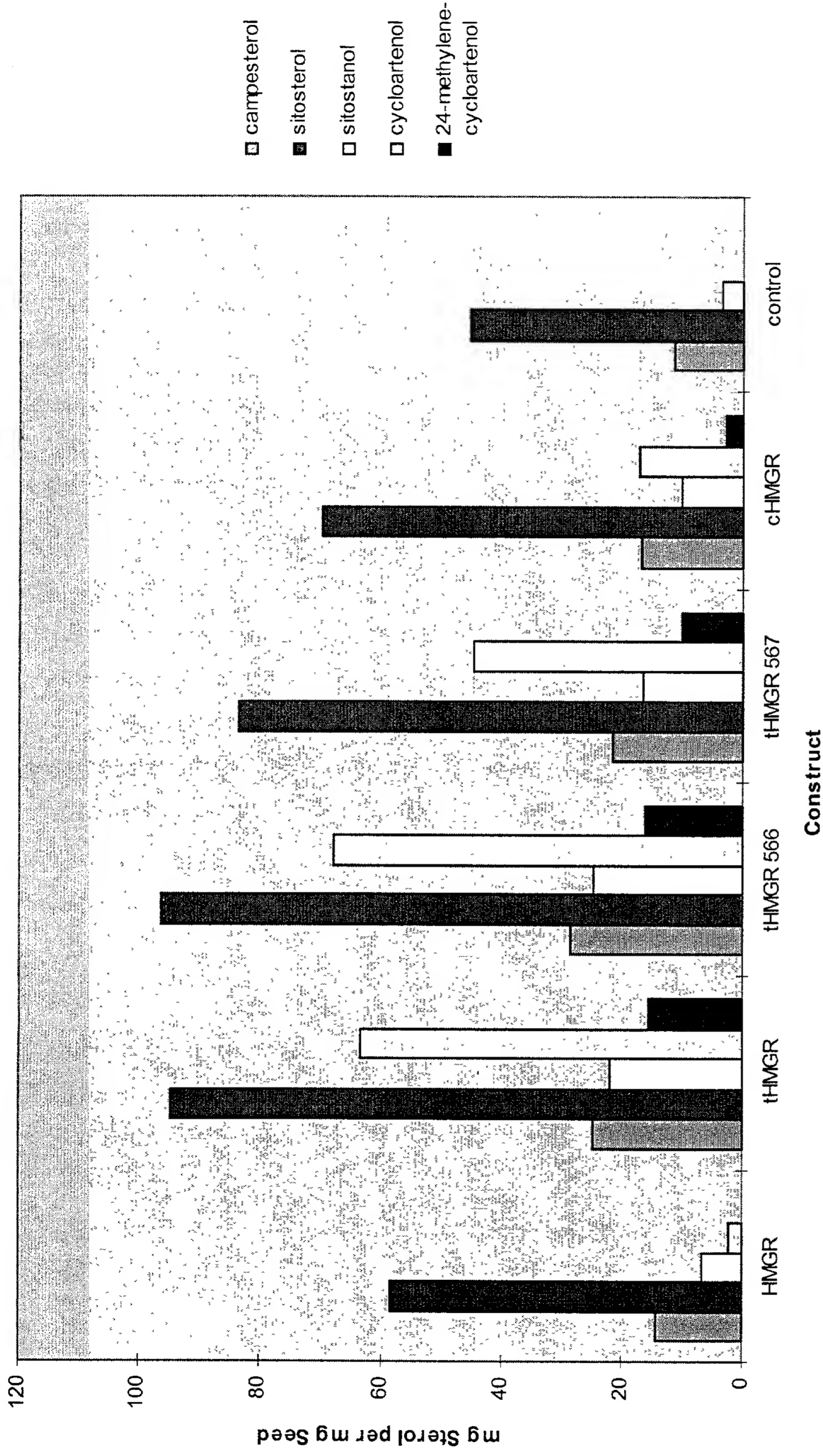
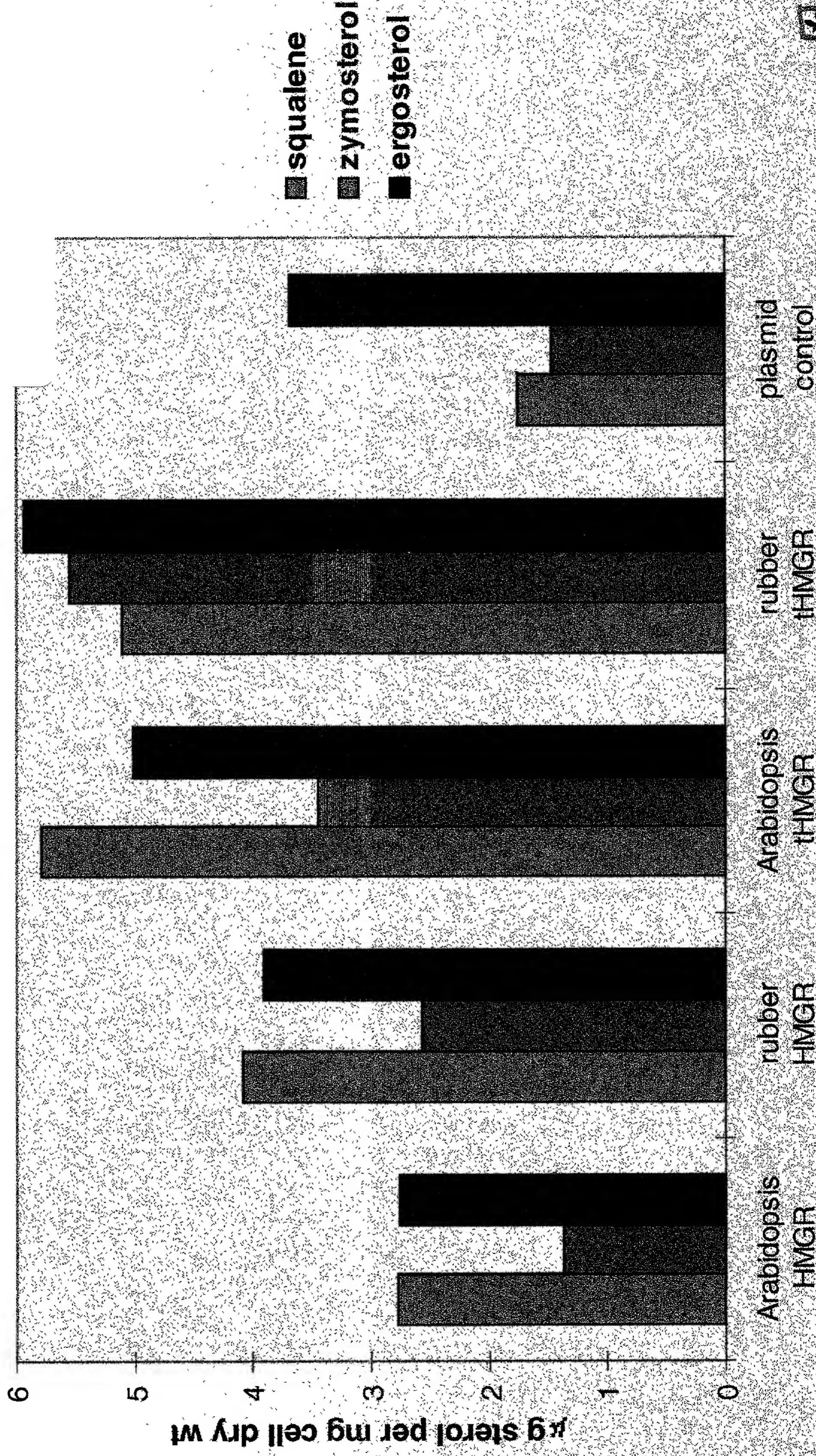


Figure 27: Sterol profile of transgenic *Arabidopsis* harboring different forms of rubber HMGR. HMGR: rubber full length HMGR; tHMGR: catalytic domain of rubber HMGR with the linker region; tHMGR 566: catalytic domain with linker region of rubber HMGR in which the serine residue at 566 is converted to alanine; tHMGR 567: catalytic domain with linker region of rubber HMGR in which the serine residue at 567 is converted to alanine; cHMGR: catalytic domain of rubber HMGR without the linker region.

Plant HMGR Constructs in Yeast HMGR1

Knockout Mutant

FIGURE 28



CRC T10R1

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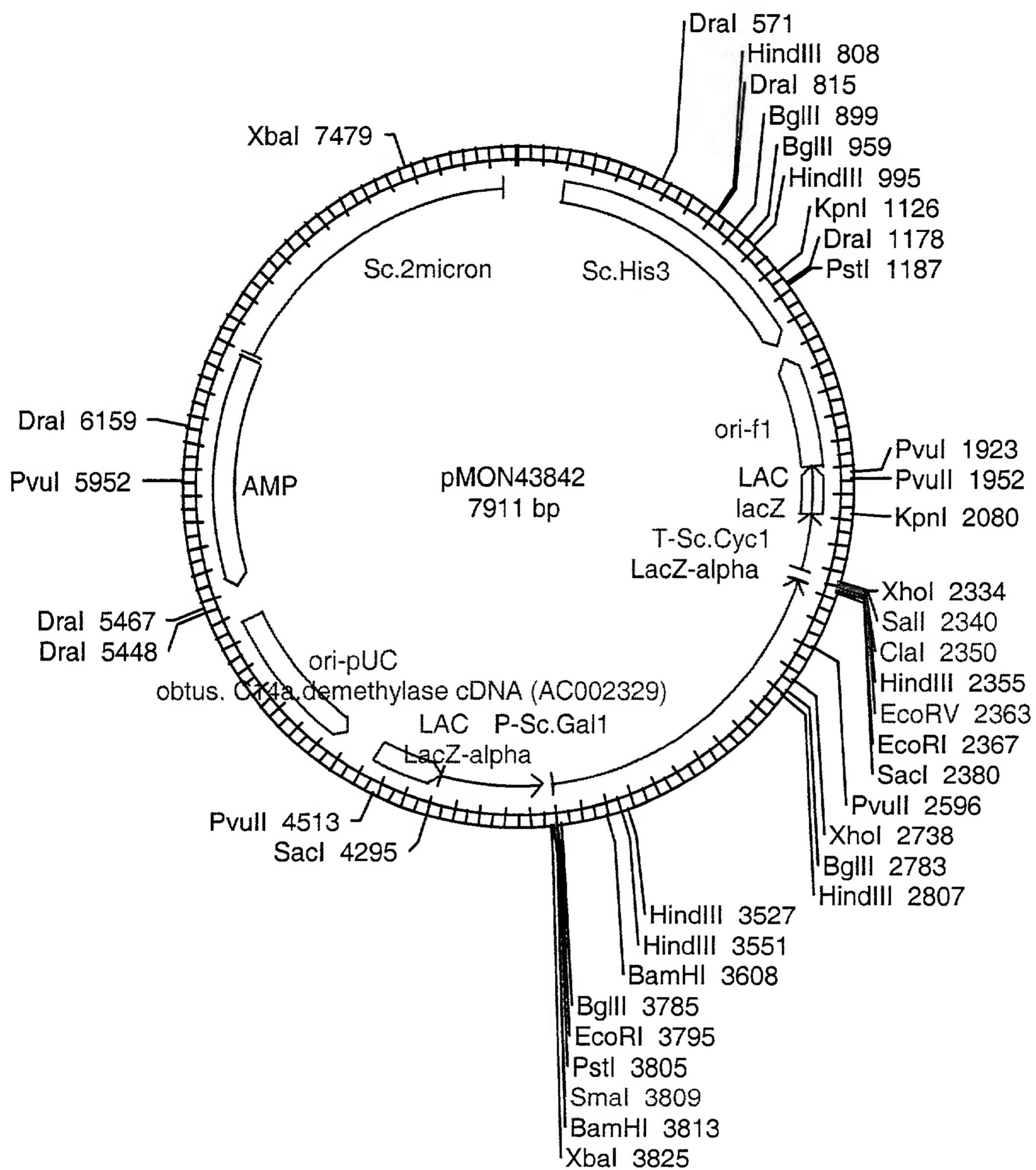


Figure 29: Construct pMON43842

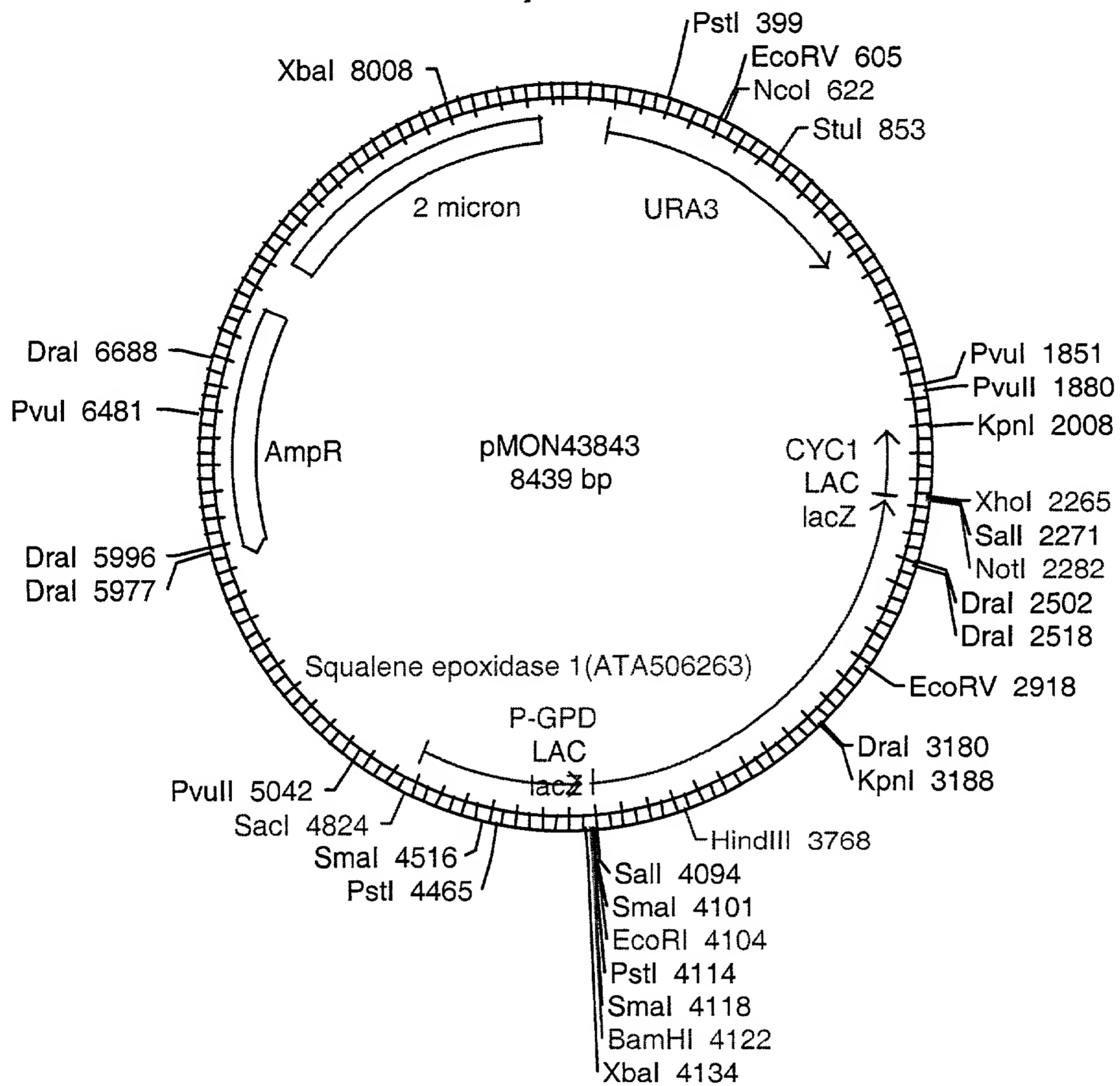


Figure 30: Construct pMON43843

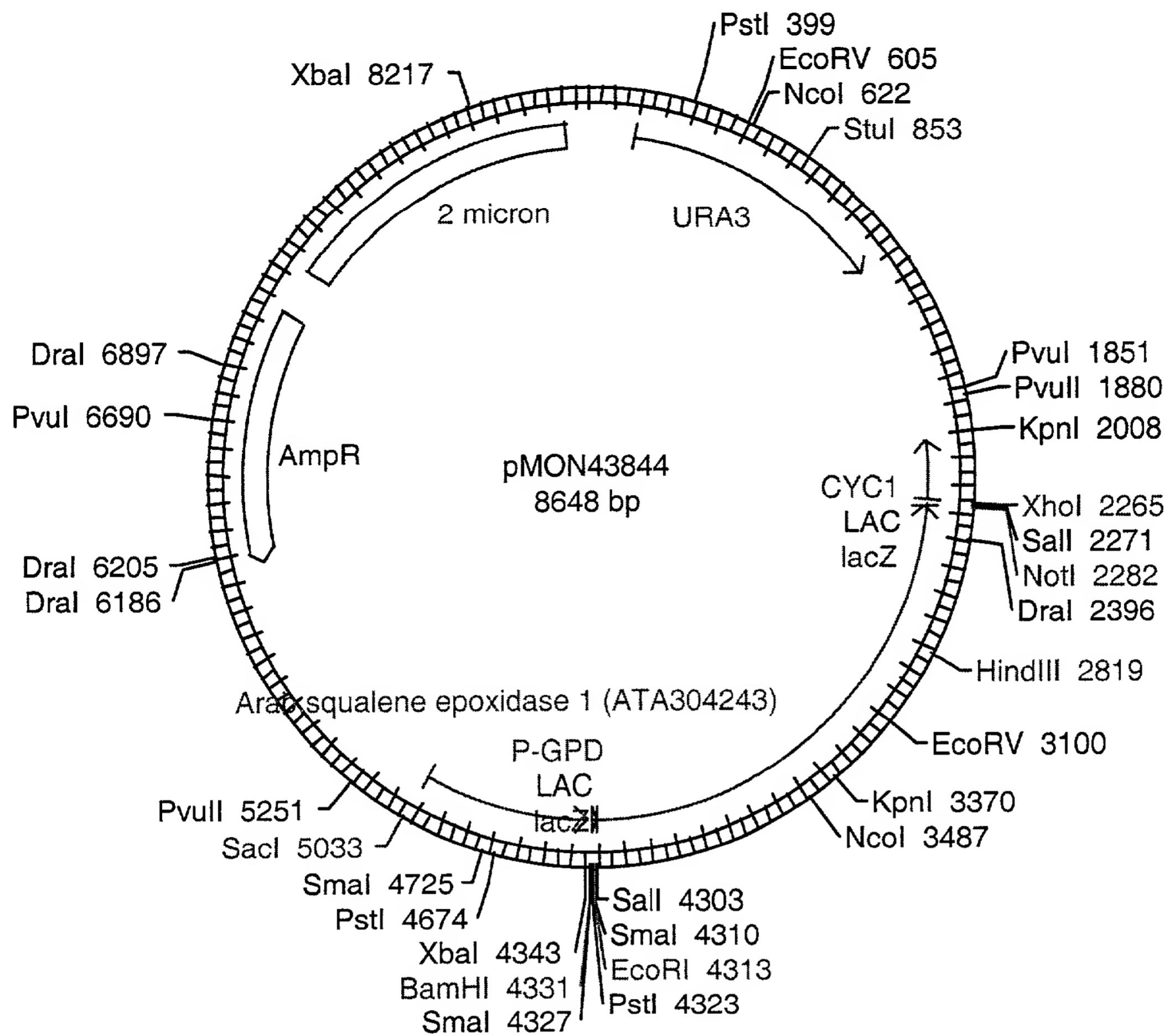


Figure 31: Construct pMON43844

Plurality: 5.00 Threshold: 4 AveWeight 1.00 AveMatch 2.91 AvMisMatch -2.00
1

50
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} MSLPLKTIVH LVKPFACAR FSARYPIHVI VVAVLLSAAA
 YLSVTQSYLN
 HMGRclustalW{ yeast1} MPPLFKGLKQ MAKPIAYVSR FSAKRPIHII LFSLIISAF
 YLSVIQYYFN
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium}

 HMGRclustalW{ candida}

 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice}

 HMGRclustalW{ corn}

 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3}

 HMGRclustalW{rosyperiwi}

 HMGRclustalW{ tomato}

 HMGRclustalW{woodtobacc}

 HMGRclustalW{ potato}

 HMGRclustalW{radish}

 HMGRclustalW{arabadopsis1}

 HMGRclustalW{cucumismel}

 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertrel}

 HMGRclustalW{camptothec}

 HMGRclustalW{arabadops2}

 HMGRclustalW{chineseham}

FIGURE 32A

HMGRclustalW{chineseha2}

 HMGRclustalW{syrianhamst}

 HMGRclustalW{ rat}

 HMGRclustalW{ rabbit}

 HMGRclustalW{ human}

 HMGRclustalW{ mouse}

 HMGRclustalW{ xenopus}

 HMGRclustalW{sea urchin}

 HMGRclustalW{ cockroach}

 HMGRclustalW{drosophila}

 HMGRclustalW{dictyostel}

 HMGRclustalW{schistosom}

 HMGRclustalW{archaeoglo}

 HMGRclustalW{pseudomonas}

 Consensus -----

FIG. 32B

100
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} EWKLDN.QY STYLSIKPDE LFEKCTHYR SPVSDTWKLL
 SSKEAADIYT
 HMGRclustalW{ yeast1} GWQLDSNSVF ETAPNKDSNT LFQECSHYR DSSLDGWVSI
 TAHEASELPA
 HMGRclustalW{phycomyc}

 HMGRclustalW{ fusarium}MDH EGCQGQHPQQ
 CCQWVSNAWS
 HMGRclustalW{ candida}MFYH GASANQHWIA
 VDDLKVPVD
 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice}

 HMGRclustalW{ corn}

 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3}

 HMGRclustalW{rosyperiwi}

 HMGRclustalW{ tomato}

 HMGRclustalW{woodtobacc}

 HMGRclustalW{ potato}

 HMGRclustalW{radish}

 HMGRclustalW{arabadopsis1}

 HMGRclustalW{cucumismel}

 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1}

 HMGRclustalW{camptothec}

 HMGRclustalW{arabadops2}

 HMGRclustalW{chineseham}MLSR LFRMH
 GLFVASHPWE
 HMGRclustalW{chineseha2}MLSR LFRMH

GLFVASHPWE			
HMGRclustalW{syrianhamst}	.....		.MLSRLFRMH
GLFVASHPWE			
HMGRclustalW{ rat}	.....		.MLSRLFRMH
GLFVASHPWE			
HMGRclustalW{ rabbit}	.....		.MLSRLFRMH
GLFVASHPWE			
HMGRclustalW{ human}	.....		.MLSRLFRMH
GLFVASHPWE			
HMGRclustalW{ mouse}	.....	
.....			
HMGRclustalW{ xenopus}	.....		.MLSRLFRMH
GQFVASHPWE			
HMGRclustalW{sea urchin}	.....		.MLSRLFLAQ
GRFCSSHPWE			
HMGRclustalW{ cockroach}	.....		.MVGRLFRAH
GQFCASHPWE			
HMGRclustalW{drosophila}	.....		.MIGPLFRAT
.QFCASHPWE			
HMGRclustalW{dictyostel}	.....	
.....			
HMGRclustalW{schistosom}	.....	
.....			
HMGRclustalW{archaeoglo}	.....	
.....			
HMGRclustalW{pseudomonas}	.....	
.....			
	Consensus	-----	-MLSRLFRMH
GLFVASHPWE			

FIG. 32D

101

150
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} PFHYYLSTIS FQSKDNSTTL PSLDDVIYSV DHTRYLLSEE
 PKIPTELVSE
 HMGRclustalW{ yeast1} PHHYLLNLN FNSPNETDSI PELANTVF EK DNTKYILQED
 LSVSKEISST
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} EFLDLLKNAE TLDIVIMLLG YIAMHLTFVS LFLSMRKMGS
 KFWLGICTLF
 HMGRclustalW{ candida} VDHYNVVPFQ FRRAGEYKEP VLSGIVELDE VKFVVSQSDA
 AEQWQQLTAE
 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice}

 HMGRclustalW{ corn}

 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3}

 HMGRclustalW{rosyperiw}

 HMGRclustalW{ tomato}

 HMGRclustalW{woodtobacc}

 HMGRclustalW{ potato}

 HMGRclustalW{radish}

 HMGRclustalW{arabadopsis1}

 HMGRclustalW{cucumismel}

 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1}

 HMGRclustalW{camptothec}

 HMGRclustalW{arabadops2}

 HMGRclustalW{chineseham} VIVGTVT..L TICMMSMN.. MFTGNNK... ..


```

HMGRclustalW{chineseha2} VIVGTVT..L TICMMSMN.. MFTGNNK... ..
.....
HMGRclustalW{syrianhamst} VIVGTVT..L TICMMSMN.. MFTGNNK... ..
.....
HMGRclustalW{      rat} VIVGTVT..L TICMMSMN.. MFTGNNK... ..
.....
HMGRclustalW{      rabbit} VIVGTVT..L TICMMSMN.. MFTGNDK... ..
.....
HMGRclustalW{      human} VIVGTVT..L TICMMSMN.. MFTGNNK... ..
.....
HMGRclustalW{      mouse} .....
.....
HMGRclustalW{      xenopus} VIVGTVT..L TICMMSMN.. MFTGNDK... ..
.....
HMGRclustalW{sea urchin} VIVCTLT..L TICMLSMN.. YFTGLPR... ..
.....
HMGRclustalW{cockroach} VIVATLT..L TVCMLTVDQ. RPLGLP.... ..
.....
HMGRclustalW{drosophila} VIVALLT..I TACMLNGGQE QYPGCEQRIG HSTASAAAAG
SGSGAGSGAS
HMGRclustalW{dictyostel} .....
.....
HMGRclustalW{schistosom} .....
.....
HMGRclustalW{archaeoglo} .....
.....
HMGRclustalW{pseudomonas} .....
.....

Consensus VIVGTVT--L TICMMSMN-- MFTGNNK--- -----
-----

```

FIG 32F

151

200

```

HMGRclustalW{methanobac} .....
.....
HMGRclustalW{methanococ} .....
.....
HMGRclustalW{halobacter} .....
.....
HMGRclustalW{sulfolobus} .....
.....
HMGRclustalW{      yeast2} NGTKWRLRNN SNFILDHNI YRNMVKQFSN KTSEFDQFDL
FIILAAYLTL
HMGRclustalW{      yeast1} DGTKWRLRSD RKSLEFDVKTL AYSLYDVFSE NVTQADPFDV
LIMVTAYLMM
HMGRclustalW{phycomyces} .....
.....
HMGRclustalW{  fusarium} SSVFAFLFGL VVTTKLGVP I SVILLSEGLP FLVVTIGFEK
NIVLTRA VMS
HMGRclustalW{  candida} DGTWVRSRAY HGKLGKYS DM AVGAFNKVLN LVRGAETFDI
ALVTCAYIAM
HMGRclustalW{dictyoste2} .....
.....
HMGRclustalW{wheat1} .....
.....
HMGRclustalW{      rice} .....
.....
HMGRclustalW{  corn} .....
.....
HMGRclustalW{wheat3} .....
.....
HMGRclustalW{wheat2} .....
.....
HMGRclustalW{      soybean} .....
.....
HMGRclustalW{rubbertre3} .....
.....
HMGRclustalW{rosyperiw i} .....
.....
HMGRclustalW{      tomato} .....
.....
HMGRclustalW{woodtobacc} .....
.....
HMGRclustalW{      potato} .....
.....
HMGRclustalW{radish} .....
.....
HMGRclustalW{arabadopsi s1} .....
.....
HMGRclustalW{cucumismel} .....
.....
HMGRclustalW{rubbertre2} .....
.....
HMGRclustalW{rubbertre1} .....
.....
HMGRclustalW{camptothec} .....
.....
HMGRclustalW{arabadops2} .....
.....
HMGRclustalW{chineseham} .....I CGWNYEC.PK FEEDVLSSDI
IILTITRCIA

```


201

250

```

HMGRclustalW{methanobac} .....
.....
HMGRclustalW{methanococ} .....
.....
HMGRclustalW{halobacter} .....
.....
HMGRclustalW{sulfolobus} .....
.....
HMGRclustalW{      yeast2} FYTLCCLFND MRKIGSKFWL SFSALSNSAC ALYLSLYTTH
SLLKKPASLL
HMGRclustalW{      yeast1} FYTIFGLFND MRKTGSNFWL SASTVVNSAS SLFLALYVTQ
CILGKEVSAL
HMGRclustalW{phycomyces} .....
.....
HMGRclustalW{  fusarium} HAIEHRRIOA QNSKSGKRSP DGSTQNMIOY AVQAAIKEKG
FEIIRDYAIE
HMGRclustalW{  candida} FYTLFNLFAR MRAVGSKVWL GLSTLVSSFF AFLFALYITT
RVLDSLIPFL
HMGRclustalW{dictyoste2} .....
.....
HMGRclustalW{wheat1} .....
.....
HMGRclustalW{      rice} .....
.....
HMGRclustalW{  corn} .....
.....
HMGRclustalW{wheat3} .....
.....
HMGRclustalW{wheat2} .....
.....
HMGRclustalW{      soybean} .....
.....
HMGRclustalW{rubbertre3} .....
.....
HMGRclustalW{rosyperiwi} .....
.....
HMGRclustalW{      tomato} .....
.....
HMGRclustalW{woodtobacc} .....
.....
HMGRclustalW{      potato} .....
.....
HMGRclustalW{radish} .....
.....
HMGRclustalW{arabadopsis1} .....
.....
HMGRclustalW{cucumismel} .....
.....
HMGRclustalW{rubbertre2} .....
.....
HMGRclustalW{rubbertre1} .....
.....
HMGRclustalW{camptothec} .....
.....
HMGRclustalW{arabadops2} .....
.....
HMGRclustalW{chineseham} ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....

```

FIG. 32I

```

HMGRclustalW{chineseha2}  ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{syrianhamst} ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{      rat}   ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{      rabbit} ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{      human}  ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{      mouse}  .....
.....
HMGRclustalW{      xenopus} ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH
.....
HMGRclustalW{sea urchin}  VAYLYLQFTK LRTTGSKYIL GIAGLFTIFS SFLFSSAVIH
.....
HMGRclustalW{cockroach}  VLYSYYQFCH LQKLGSKYIL GIAGLFTVFS SFVFSSSVIN
.....
HMGRclustalW{drosophila}  VLYCYYQFCS LHRLGSKYVL GIAGLFTVFS SFIFTTAAIK
.....
HMGRclustalW{dictyostel}  .....
.....
HMGRclustalW{schistosom}  RTHLLHFSSS NCHLDVIIYQ SRAVIIFLVV FVYFIGVLTC
KINDKILVHT
HMGRclustalW{archaeoglo}  .....
.....
HMGRclustalW{pseudomonas} .....
.....

Consensus  ILYIYFQFQN LRQLGSKYIL GIAGLFTIFS SFVFSTVVIH -----
-----

```

FIG. 325

251

300
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} SLVIGLPFIV VIIG.FKHKV RLAAFSLQKF HRISIDKKIT
 VSNIIEAMF
 HMGRclustalW{ yeast1} TLFEGLPFIV VVVG.FKHKI KIAQYALEKF ERVGLSKRIT
 TDEIVFESVS
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} IVILVIGAAS GVQGG LQQFC FLAAWTLF.F DFILLFTFYT
 AILSIKLRST
 HMGRclustalW{ candida} SLSEGIPFFV AVVG.FNNKI LLAEKVLQ.N QLNAQSSKND
 APTVLYQALR
 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice}

 HMGRclustalW{ corn}M EVRG..... .GVGQGSAAAR
HPPA
 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3}M DEVRRRPP.K HIVRKDHDGE
 VLNSFSHG..
 HMGRclustalW{rosyperiw}M DSRRRSP... TVTAKAAAGE
 LPLAPHEGQ.
 HMGRclustalW{ tomato}M DVRRRSEEPV YPSKVFAADE
 KPLKPHKKQQ
 HMGRclustalW{woodtobacc}M DVRRRSEKPA YPTKEFAAGE
 KPLKPHK..
 HMGRclustalW{ potato}M DVRRRPVKPL YTSKDASAG.
 EPLKQQE..
 HMGRclustalW{radish}M DIRR..RPPK PPVNSN....
 ...RFLDNRS
 HMGRclustalW{arabadosis1}M DLRR..RPPK PPVTNNNNNSN
 GSFRSYQPRT
 HMGRclustalW{cucumismel}M DRRRSLRPPR PNAVQDADAT
 CTFRRDEQDA
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1}M DTTG..RLH.HR....
KHAT
 HMGRclustalW{camptothec}M DVRRRSINSI HQIPSVGGTA
 PPMLKPKQPT
 HMGRclustalW{arabados2}M EDLRRRFPTK KNGEEISN..

 HMGRclustalW{chineseham} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE
 VRENIARGMA

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HMGRclustalW{chineseha2} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE
VRENIARGMA
HMGRclustalW{syrianhamst} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE
VRENIARGMA
HMGRclustalW{      rat} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE
VRENIARGMA
HMGRclustalW{      rabbit} FLDKELTGLN EALPFFLLLI DLSRASALAK FALSSNSQDE
VRENIARGMA
HMGRclustalW{      human} FLDKELTGLN EALPFFLLLI DLSRASTLAK FALSSNSQDE
VRENIARGMA
HMGRclustalW{      mouse} .....
.....
HMGRclustalW{      xenopus} FLDKELTGLN EALPFFLLLI DLSKASALAK FALSSNSQDE
VRDNIARGMA
HMGRclustalW{sea urchin} LFGLELTGLN EALPFFLLLI DLTKASALTK FALSSTTQNE
VVDNIARGMA
HMGRclustalW{cockroach} FLGSDVSDLK DALFFFLLLI DLSKATVLAQ FALSSRSQDE
VKHNIARGIA
HMGRclustalW{drosophila} FLGSDISELK DALFFLLLV I DLSNSGRLRS GAMGSN.QAE
VTQNIARGLE
HMGRclustalW{dictyostel} .....
.....
HMGRclustalW{schistosom} MLRNKRQLNT LFYTLILFTF ALCSLSSVLF VPYTSFAIFL
LSTSVFLLFS
HMGRclustalW{archaeoglo} .....
.....
HMGRclustalW{pseudomonas} .....
.....

Consensus FLDKELTGLN EALPFFLLL- DL-RASALAK FALSSNSQDE
VRENIARGMA

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FIG. 32L

301

350
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} QEGAYLIRDY LFYISSFIGC AIYARHLPGL VNFCILSTFM
 LVFDLLLSAT
 HMGRclustalW{ yeast1} EEGRRLIQDH LLCIFAFIGC SMYAHQLKTL TNFCILSAFI
 LIFELILTPT
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} VSSVMSICVW PLRMMASRRV AENVAKGDDE LNRVRGDAPL
 FGRKSSSIPK
 HMGRclustalW{ candida} EQGPLLLRDH LFMITAFLGC SFYASYLDGL KNFCILAALI
 LAFDILTST
 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice}MRIT.....
 ...NGLAMVS
 HMGRclustalW{ corn} PE....PSRAAA RVQAGDALPL PIRHT.....
 ...NLIFSAL
 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3}HH L.....PP LKPSDYSLPL SLYLA.....
 ...NALVFSL
 HMGRclustalW{rosyperiwi}NQ Q.....PS IPRSSDVLPL PLYLA.....
 ...NGVFFTL
 HMGRclustalW{ tomato} QQ....QEDK N.....TL LIDASDALPL PLYLTT....
 ...NGLFFTM
 HMGRclustalW{woodtobacc} QQ....QEOD N.....SL LI.ASDALPL PLYLT.....
 ...NGLFFTM
 HMGRclustalW{ potato}VS SPKASDALPL PLYLT.....
 ...NGLFFTM
 HMGRclustalW{radish} DD....DDRR K.....TLTS PPKASDALPL PLYLT.....
 ...NAVFFTL
 HMGRclustalW{arabadopsis1} SD....DDHR RR..ATTIAP PPKASDALPL PLYLT.....
 ...NAVFFTL
 HMGRclustalW{cucumismel} SA....ADHL KR.....A SPKASDALPL PLYLT.....
 ...NTIFFTL
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1} PV....EDRS P.....T TPKASDALPL PLYLT.....
 ...NAVFFTL
 HMGRclustalW{camptothec} KV....DAVD L.....PD SPKASDALPL PLYIT.....
 ...NGVFFTL
 HMGRclustalW{arabadops2}VAVDPP LRKASDALPL PLYLT.....
 ...NTFFLSL
 HMGRclustalW{chineseham} ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
 VLANYFVFMT

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    HMGRclustalW{chineseha2}  ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
    HMGRclustalW{syrianhamst}  ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
    HMGRclustalW{      rat}    ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
    HMGRclustalW{      rabbit}  ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
    HMGRclustalW{      human}   ILGPTFTLDA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFVFMT
    HMGRclustalW{      mouse}   .....
.....
    HMGRclustalW{      xenopus}  ILGPTFTLEA LV..ECLVIG VGTMSGVRQL EIMCCFGCMS
VLANYFAFMT
    HMGRclustalW{sea urchin}    ILGPTITLDT VV..TTLVIS IGTMSIRKM EVFCCFGILS
LIANYFVFMT
    HMGRclustalW{cockroach}     MLGPTITLDT VV..ETLVIG VGMLSGVRRL EVLCCFACMS
VIVNYVVFMT
    HMGRclustalW{drosophila}     LLGPAISLDT IV..VLLVG  VGTLSGVQRL EVLCMFAVLS
VLVNYVVFMT
    HMGRclustalW{dictyostel}     .....M LFAPPNLETK ELFWIIY.IL
ILIPKVFAKV
    HMGRclustalW{schistosom}     DLSVFFIVLE YLLEIELVN YEHAHRHCLL SHLFSNQLFV
DHMLGMFLKT
    HMGRclustalW{archaeoglo}     .....
.....
    HMGRclustalW{pseudomonas}    .....
.....

                                Consensus  ILGPTFTLDA LV--ECLVIG VGTASD-LPL -LYCTFGCMS
VLANYFFFMT

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FIG. 32N

351

400
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} FYSAILSMKL EINIIHRSTV IRQTL..EED GVVPTTADII
 YKDETASEPH
 HMGRclustalW{ yeast1} FYSAILALRL EMNVIHRSTI IKQTL..EED GVVPTSTARI
 SKAEKKS SVSS
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} FKVLMILGFI FVNIVNICSI PFRNP..SSM STIRTWASSL
 GGVIAPLSVD
 HMGRclustalW{ candida} FLSAILSLKL EINQIHRSTL LREQ..EDD GLTETTVDDV
 LKSNSLAGTK
 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice} LVLSSCDLVR LCSDRER... PL..... ..GGREFA
 TVVCQLASVV
 HMGRclustalW{ corn} FAASLAYLMR RWREKIRSST PLHA..... ..VGLAEML
 AIFGLVASLI
 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3} FFSVAYFLLH RWREKIRKST PLHI..... ..VTFPEIA
 ALICLVASVI
 HMGRclustalW{rosyperiwi} FFSVMYFLLT RWREKIRNAT PLHV..... ..VTLSELA
 ALASLIASVI
 HMGRclustalW{ tomato} FFSVMYFLLS RWREKIRNST PLHV..... ..VTLSELG
 AIVSLIASVI
 HMGRclustalW{woodtobacc} FFSVMYLLS RWREKIRNST PLHV..... ..VTFSELV
 AIASLIASVI
 HMGRclustalW{ potato} FFSVMYFLLV RWREKIRNSI PLHV..... ..VTLSELL
 AMVSLIASVI
 HMGRclustalW{radish} FFSVAYYLLH RWRDKIRYNT PLHV..... ..VTVTELG
 AIVALIASFI
 HMGRclustalW{arabadosis1} FFSVAYYLLH RWRDKIRYNT PLHV..... ..VTITELG
 AIIALIASFI
 HMGRclustalW{cucumismel} FFSVAYYLLH RWRDKIRNST PLHV..... ..VTLSEIA
 AIVSLMASFI
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertrel} FFSVAYYLLH RWRDKIRNST PLHI..... ..VTLSEIV
 AIVSLIASFI
 HMGRclustalW{camptothec} FFTVYVYLLV RWREKIRNST PLHV..... ..VTLSEIA
 AIFTFVASFI
 HMGRclustalW{arabados2} FFATVYFLLS RWREKIRNST PLHV..... ..VDLSEIC
 ALIGFVASFI
 HMGRclustalW{chineseham} FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEE.
 NKPNPVTQRV

FIG. 320

HMGRclustalW{chineseha2}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{syrianhamst}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{ rat}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{ rabbit}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{ human}	FFPACVSLVL ELSRESREGR PIWQ...LSH FARVLEEEEE.
NKPNPVTQRV	
HMGRclustalW{ mouse}	.....
.....	
HMGRclustalW{ xenopus}	FFPACVSLVL ELSRESREGR PIWQ...LSQ FASVLEEEED
NKPNPVTQRV	
HMGRclustalW{sea urchin}	FFPACLSLVL ELSNSNKYGR PVWH...LGR FAEVLEEEED
RKPNPVVQRV	
HMGRclustalW{ cockroach}	FYPACLSLIL ELSRSGESGR PAWHD..KSL IIKALHEED.
QKPNPVVQRV	
HMGRclustalW{drosophila}	FYPACLSLIF DLSRSGVDMS VVREKAKGSL PLKSLTEEE.
QKANPVLQRV	
HMGRclustalW{dictyoste1}	MSVRELFPPF KWGFNIRRSN FLVP..... ...ILSNNVI
VTGEEAVQYE	
HMGRclustalW{schistosom}	SLFSISTTSK YAYLESIFKC TLMEQIIYIM IVFVFLPSFM
RIFASYAKRM	
HMGRclustalW{archaeoglo}	.....
.....	
HMGRclustalW{pseudomonas}	.....
.....	
Consensus	FFSACYSLLL -WRRKIRNST PLHV---LSH FARVTLEEEA AKPN-
VASRI	

FIG. 32P

401

450
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} FLRSNVAIIL GKASVIGLLL LINLYVF... .TDKLNATIL
 NTVYFDSTIY
 HMGRclustalW{ yeast1} FLNLSVVVII MKLSVILLFV FINFYNF... GANWVN.DAF
 NSLYFDKERV
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} PFKVASNGLD AILPTAKSNN RPTLVTV... LTPIKYELEY
 PSIHYPALGSA
 HMGRclustalW{ candida} TFTDAPSTLV TVAKVAGVSV FFGLHIFY... GFCSAWLSDL
 SAGNETNDTF
 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice} YLLSLFAHPD APATTGDDD

 HMGRclustalW{ corn} YLLSFFGIAF VQSIVSSGDD

 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3} YLLGFFGIGF VHSFS.RAST

 HMGRclustalW{rosyperiwi} YLVSFFGLDF VQSLIYKPNN

 HMGRclustalW{ tomato} YLLGFFGIGF VQTFVSRGNN

 HMGRclustalW{woodtobacc} YLLGFFGIGF VQSFVSRDNN

 HMGRclustalW{ potato} YLLGFFGIGF VQSFVSRSNS

 HMGRclustalW{radish} YLLGFFGIDF VQSFISRP..

 HMGRclustalW{arabadosis1} YLLGFFGIDF VQSFISRASG

 HMGRclustalW{cucumismel} YLLGFFGIDF VQSFIRASSP

 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1} YLLGFFGIDF VQSFIRASH

 HMGRclustalW{camptothec} YLLGFFGIGL VQPFTSRSSH

 HMGRclustalW{arabados2} YLLGFCGIDL IFRSS..SD.

 HMGRclustalW{chineseham} KMIMSLGLVL VHAHSRWIAD PSPQNST... TE.HSKVSLG
 LDEDVSKRIE

FIG. 32Q

HMGRclustalW{chineseha2}	KMIMSLGLVL	VHAHSRWIAD	PSPQNST...	TE.HSKVSLG
LDEDVSKRIE				
HMGRclustalW{syrianhamst}	KMIMSLGLVL	VHAHSRWIAD	PSPQNST...	TE.HSKVSLG
LDEDVSKRIE				
HMGRclustalW{rat}	KMIMSLGLVL	VHAHSRWIAD	PSPQNST...	AE.QSKVSLG
LAEDVSKRIE				
HMGRclustalW{rabbit}	KMIMSLGLVL	VHAHSRWIAD	PSPQNST...	AD.NSKVSLG
LDENVSKRIE				
HMGRclustalW{human}	KMIMSLGLVL	VHAHSRWIAD	PSPQNST...	AD.TSKVSLG
LDENVSKRIE				
HMGRclustalW{mouse}	.....	.....	.....	.....
.....				
HMGRclustalW{xenopus}	KMIMSLGLVL	VHAHSRWIAD	PSSQNST...	SISDHEVTTM
LDDMMPKRVE				
HMGRclustalW{sea urchin}	KMIMRTGLVL	VHAHSRWLAS	....NDT...	ELMSRDMLYD
GNLLTDKKID				
HMGRclustalW{cockroach}	KVIMSAGLML	VHAH.RWVRC	.....	.....L.
.....				
HMGRclustalW{drosophila}	KLIMTTGLMA	VHIYSREVSP	....AAT...	TMVDKTLTPT
LSLNVSNNRT				
HMGRclustalW{dictyostel}	KPLPYIPQHN	QQQQQKQOPS	.....	.....
.....				
HMGRclustalW{schistosom}	YGEQKKCLVS	NKGVSSSTRK	RRHSYSSGHS	YVEYRRMSVH
NLIGYVVNPN				
HMGRclustalW{archaeoglo}	.....	.....	.....	.....
.....				
HMGRclustalW{pseudomonas}	.....	.....	.....	.....
.....				
	Consensus	YLL-FFG-VL	V-A-SR-ISK	PSPQNST--- ---SKVSLG LDE-
VSKRIE				

FIG. 32R

451

500
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} SLPNFINYKD IGNLSNQVII SVLPKQYYTP LKKYHQIEDS
 VLLIIDSVS
 HMGRclustalW{ yeast1} SLPDFITSNA SENFKEQAIV SVTPLLYYKP IKSYQRIEDM
 VLLLLLRNVSV
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} ASNPAYN.DA FHHHFQGYGV GGRMVGGILK SLEDPVLSKW
 IVIALALSVA
 HMGRclustalW{ candida} TLYDAVA.DQ IPIGSNGTLV TLFPTRFPLP EKLSTQIEAV
 VLSFIGLIST
 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice} ..D.....

 HMGRclustalW{ corn} ..DEDFLVGS G.....

 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3} ..D.SWDVEE Y.....D DDNIIIKEDT
 R.....
 HMGRclustalW{rosyperiw} ..E.GWEIEEEILMVEDS
 RN.....
 HMGRclustalW{ tomato} ..D.SWDE..N DEEFLLKEDS
 RC.....
 HMGRclustalW{woodtobacc} ..DECWDEED E.....N DEQFLLEEDS
 RR.....
 HMGRclustalW{ potato} ..D.SWDIED E.....N AEQLIIEEDS
 RR.....
 HMGRclustalW{radish} ..D.SGDSERDFDDH
 R.....
 HMGRclustalW{arabadopsis1} ..D.AWDLAD T.....IDDDDH
 R.....
 HMGRclustalW{cucumismel} ..D.AWDLEDEIDRT
 L.....
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1} ..D.VWDLED T.....D P.NYLIDEDH
 R.....
 HMGRclustalW{camptothec} ..DDVWGVDD DE.....D VDEIVLKEDT
 R.....
 HMGRclustalW{arabadops2} ..DDVWVNDG

 HMGRclustalW{chineseham} PSVSLWQFYL SKMISMDIEQ VVTLSLAFL L AVKYIFFEQA
 ET..ESTLSL

FIG. 325

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HMGRclustalW{chineseha2} PSVSLWQFYL SKMISMDIEQ VVTLSLAFL L AVKYIFFEQA
ET..ESTLSL
HMGRclustalW{syrianhamst} PSVSLWQFYL SKMISMDIEQ VVTLSLAFL L AVKYIFFEQA
ET..ESTLSL
HMGRclustalW{ rat} PSVSLWQFYL SKMISMDIEQ VITLSLALL L AVKYIFFEQA
ET..ESTLSL
HMGRclustalW{ rabbit} PSVSLWQFYL SKMISMDIEQ VITLSLALL L AVKYIFFEQA
ET..ESTLSL
HMGRclustalW{ human} PSVSLWQFYL SKMISMDIEQ VITLSLALL L AVKYIFFEQT
ET..ESTLSL
HMGRclustalW{ mouse} .....
.....
HMGRclustalW{ xenopus} PSMPLWQFYL SRMVTMDVEQ IITLGLALL L AVKYIFFEQT
ET..ESTFSM
HMGRclustalW{sea urchin} PTMPLWEFYA TRLWPPTLDY ILTAILATVL ASHYIFFSDL
ATYPEKRVSI
HMGRclustalW{ cockroach} .SIALWPDLT S.....LRY FCTHCDTGVS YSRWSFASEG
EE..LPTVKL
HMGRclustalW{drosophila} ESGEIADIII KWL.TMSADH IVISIVLIAL VVKFICFDNR
DP...LPDQL
HMGRclustalW{dictyoste1} ..QDYIQQPQ ..... ..N....DNN
IN.....
HMGRclustalW{schistosom} CHYKCWSTTF VIFVSLIILH LNNRYSERIS SFKHNSSENE
VFPVLYHITA
HMGRclustalW{archaeoglo} .....
.....
HMGRclustalW{pseudomonas} .....
.....

Consensus PSDSLWDFY- SKMISMDIEQ VVTLSLA-LL AVKYIFFED- RT--
ESTLSL

```

501

550

HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} AIRDQFISKL LFFAFAVSIS INVYLLNAAK IHTGYMNFQ.
 ..PQSNKIDD
 HMGRclustalW{ yeast1} AIRDRFVSKL VLSALVCSAV INVYLLNAAR IHTSYTADQL
 VKTEVTKKSF
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} LNGYLFNVAR WGIKDPNVPE HNIDRNELAR AREFNDTGS.
AT
 HMGRclustalW{ candida} AARDKYISKE ILFAFAVSAS INVYLLNVAR IHTTRLEDA.
IE
 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice}

 HMGRclustalW{ corn}

 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3}

 HMGRclustalW{rosyperiw}G.....

 HMGRclustalW{ tomato}G.....

 HMGRclustalW{woodtobacc}G.....

 HMGRclustalW{ potato}G.....

 HMGRclustalW{radish}

 HMGRclustalW{arabadopsis1}

 HMGRclustalW{cucumismel}

 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertrel}

 HMGRclustalW{camptothec}

 HMGRclustalW{arabadops2}

 HMGRclustalW{chineseham} KN..PITSPV VTPKKAPDNC CRREPLLVRV SEKLSSVEEE
 PGVSQDRKVE

HMGRclustalW{chineseha2}	KN..PITSPV	VTPKKAPDNC	CRREPLLVR	SEKLSSVEEE
PGVSQDRKVE				
HMGRclustalW{syrianhamst}	KN..PITSPV	ATPKKAPDNC	CRREPVL	NEKLSSVEEE
PGVNQDRKVE				
HMGRclustalW{rat}	KN..PITSPV	VTPKKAQDNC	CRREPLLVR	NQKLSSVEED
PGVNQDRKVE				
HMGRclustalW{rabbit}	KN..PITSPV	VTQKKVPDSC	CRREPVVVR	NQKFCSVEEE
AGMSQDRKVE				
HMGRclustalW{human}	KN..PITSPV	VTQKKVPDNC	CRREPMLVR	NQKCDSVEEE
TGINRERKVE				
HMGRclustalW{mouse}	.....	.....	.....	.....
.....				
HMGRclustalW{xenopus}	KN..PIISPV	AVQKKQIESC	CRREPEQ.EK	TVHVSTTEEA
S..SKEETEA				
HMGRclustalW{sea urchin}	MEGHEVVNPG	SDHEDASEVE	TIGTLSSSPS	TSDVRVIESM
TSRTQACQTD				
HMGRclustalW{cockroach}	VTGDSVNNSN	STDDAQLHYY	IMRWLTV..S	ADHIVILILL
LALAVKFVFF				
HMGRclustalW{drosophila}	RQ....SGPV	AIEAKASQTT	PIDEEHVE..	.....QEKD
TENSAAVRTL				
HMGRclustalW{dictyostel}	.....	.....	.....	.....
.....				
HMGRclustalW{schistosom}	YEVTSIFHFI	YNIFHVINAN	LVVYLFLGLF	LFKRIRLNKP
INSQLRNLNI				
HMGRclustalW{archaeoglo}	.....	.....	.....	.....
.....				
HMGRclustalW{pseudomonas}	.....	.....	.....	.....
.....				
Consensus	KN--PITSPV	VT-KKAPDNC	CRREPLLVR	--K-SSVEEE -G-
SQDRKVE				

551

600
 HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2} LVVQOKSATI EFSET..... .RSMFA SSGLETPVTA
 KDIIISEEIQ
 HMGRclustalW{ yeast1} TAPVQKASTP VLTN..... .KTVIS GSKVKSLSSA
 QSSSSGPSSS
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} LPLGEYVPPT PMRTQ..... .PSTPA ITDDEAEG..
 ..LHMTKARP
 HMGRclustalW{ candida} LKKPKKKASK TAVSV..... .PKAVV VKDSETTKSS
 EILHSSSESE
 HMGRclustalW{dictyoste2} ..KGKSVNVE DLKDQ..... .EIAL VDKGEIQP..
 ...HNLETRL
 HMGRclustalW{wheat1}

 HMGRclustalW{ rice}GQG GSR..... ..RA.....A
 PPEPAPMHGH
 HMGRclustalW{ corn}SSGS AAA..... ..PSRQHAQA
 PAPCELLGSP
 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3}PTG AC..... ..AAPSLDCS
 LSLPTKIHAP
 HMGRclustalW{rosyperiwi} ..T..NCTTL GC..... ..AVPPPSVP
 KIAPVVPQQP
 HMGRclustalW{ tomato} ..P...ATTI GC..... ..AVPAPPAR
 QIAPMAPPQP
 HMGRclustalW{woodtobacc} ..P...ATTI GCT..... ..AVPPPPAL
 QIVPMVPPQP
 HMGRclustalW{ potato} ..PCAAATTI GC..... ..VVPPPPVR
 KIAPMVPQQP
 HMGRclustalW{radish}LVTC PPP..... ..PPP....S
 QIVAAKLPNP
 HMGRclustalW{arabadopsis1}LVTC SPP..... ..TP.....
 IVSVAKLPNP
 HMGRclustalW{cucumismel}LIDN NRY..... ..AAPRSASA
 VALPSKVDA
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1}LVTC PPA..... ..NISTKTTI
 IAAPTKLPTS
 HMGRclustalW{camptothec}TVP CAA..... ..APVDCPLP
 PIKPKVVDPP
 HMGRclustalW{arabadops2}MIPC NQ..... ..SLDCREVL
 PIKPNSVDPP
 HMGRclustalW{chineseham} VIKPLVVETE SAS..... .RATFVLG.A .SGTSPPVAA
 RTQEIEIEP

```

HMGRclustalW{chineseha2} VIKPLVVETE SAS..... .RATFVLG.A .SGTSPPVAA
RTQELEIELP
HMGRclustalW{syrianhamst} VIKPLVAETE STS..... .RATFVLG.A .SGGCSPVAL
GTQEPEIELP
HMGRclustalW{      rat} VIKPLVAEAE TSG..... .RATFVLG.A .SAASPPLAL
GAQEPGIELP
HMGRclustalW{      rabbit} VIKPLVAETD SPH..... .RAAFVVGGS .SFPDTSVL
ETKEPEIELP
HMGRclustalW{      human} VIKPLVAETD TPN..... .RATFVVGNS .SLLDTSVL
VTQEPEIELP
HMGRclustalW{      mouse} .....
.....
HMGRclustalW{      xenopus} VIKPLPLETS P..... .KAKFIVG.. .DSSPLELSP
EDKNTMFDLP
HMGRclustalW{sea urchin} PVTASPRNSR SSSPVSSHV KPARFTIGSS GSGSEDEEEE
VIKEEEVEWV
HMGRclustalW{cockroach} ETRDELTTTR GMDG.....W VEVSSPVEHK YVQTEQPSCS
APEQPLEEPP
HMGRclustalW{drosophila} LFTIEDQSSA N..... ..ASTQTDLL
PLRHRLVGPI
HMGRclustalW{dictyoste1} .....SGKEQ EQ..... ..QQQQQQQQ
QQTPDITNQP
HMGRclustalW{schistosom} PKIKETLISD QVKQSPVLPK FSKKLNDIPL QSRKRIYCLH
KDDDYIDRND
HMGRclustalW{archaeoglo} .....
.....
HMGRclustalW{pseudomonas} .....
.....

Consensus VIKPLVAETE --S----- -RATFV-G-A -SA-PPPPA- -I-
PPEIELP

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FIG. 32X

601

650
 HMGRclustalW{methanobac}MS.
 ...IMDDLME
 HMGRclustalW{methanococ}MEN
 YNDILEKMLN
 HMGRclustalW{halobacter}MTD
 AASLADRVRE
 HMGRclustalW{sulfolobus}MK.
 IDEVVEKLVK
 HMGRclustalW{ yeast2} NNE.CVYALS SQDEPIRP.L SNLVELME.. ..KEQLKNMN
 NTEVSNLVVN
 HMGRclustalW{ yeast1} SEEDDSRDIE SLDKKIRP.L EELEALLS.. ..SGNTKQLK
 NKEVAALVIH
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} ANL..... ..PNRS.N EELEKLLS.. ..ENALREMT
 DEEVISLSMR
 HMGRclustalW{ candida} SEQ..... ..SSRP.L EQVIELYK.. ..DGKVKTIV
 DDEVVSLVTA
 HMGRclustalW{dictyoste2} PNN..... ..F QRAVHIRR.. ..KLLARDLQ
 KEHQRALHAQ
 HMGRclustalW{wheat1}

 HMGRclustalW{ rice} G..... ..GGMMEGD
 DEEIVAAVAS
 HMGRclustalW{ corn} AA..... ..A.. ..PEKMPED
 DEEIVASVVA
 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3}I VSTTT..... ..TSTLSDD
 DEQIIKSVVS
 HMGRclustalW{rosyperiwi} SK..... ..MV.I IEKPAPLI.. ..TPQNSEE
 DEDIKAVVA
 HMGRclustalW{ tomato} S..... ..MS.M VEKPAPLI.. ..TSASSGE
 DEEIIKSVVQ
 HMGRclustalW{woodtobacc} SKV..... ..AA.M SEKPAPLV.. ..TPAASEE
 DEEIIKSVVQ
 HMGRclustalW{ potato} AKV..... ..ALS.Q TEKPSPII.. ..MPALSED
 DEEIIQSVVQ
 HMGRclustalW{radish} E..... ..QPPLPKE
 DEEIVKSVLD
 HMGRclustalW{arabadosis1} EP..... ..IV.. ..TESLPEE
 DEEIVKSVID
 HMGRclustalW{cucumismel} EA..... ..LN.. ..TIPLPEE
 DEEVVKMVVD
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1} EP..... ..LI.. ..APLVSEE
 DEMIVNSVVD
 HMGRclustalW{camptothec} P..... ..I.. ..SPPSSEE
 DEEIIKSVVE
 HMGRclustalW{arabados2} RE..... ..SELDSE
 DEEIVKLVID
 HMGRclustalW{chineseham} SE..... ..PRP.N EECLQILE.. SAEKGAKFLS
 DAEIIQLVNA

FIG. 32Y

HMGRclustalW{chineseha2}	SE.....	.....PRP.N	EECLQILE..	SAEKGAKFLS
DAEIIQLVNA				
HMGRclustalW{syrianhamst}	SE.....	.....PRP.N	EECLQILE..	SAEKGAKFLS
DAEIIQLVNA				
HMGRclustalW{rat}	SE.....	.....PRP.N	EECLQILE..	SAEKGAKFLS
DAEIIQLVNA				
HMGRclustalW{rabbit}	KE.....	.....PRP.N	EECLQILG..	NAEKGAKFLS
DAEIIQLVNA				
HMGRclustalW{human}	RE.....	.....PRP.N	EECLQILG..	NAEKGAKFLS
DAEIIQLVNA				
HMGRclustalW{mouse}	.....	.....	.....	.....
.....				
HMGRclustalW{xenopus}	EE.....	.....PRP.L	DECVRILK..	NPDKGAQYLT
DAEIVISLVNA				
HMGRclustalW{sea urchin}	LET.....	.ELKAPRP.M	PELLEIL...	NVGKGPNAIT
DDEVQLLVGA				
HMGRclustalW{cockroach}	AS.....	.....NRS.I	DECLSVC...	KSDVGAQALS
DCEVMALVTS				
HMGRclustalW{drosophila}	KP.....	.....PRP.V	QECLDILNST	EEGSGPAALS
DEEIVSIVHA				
HMGRclustalW{dictyostel}	TKTN.....	.....	.....	.KKIPIKELS
NEEILIKLEK				
HMGRclustalW{schistosom}	SSSVSTFSNT	CKNSNERPSN	VLDLDMLTEK	IKQGLGHELS
DTEILQLLSH				
HMGRclustalW{archaeoglo}	.....	.....	.....	.....
.MQVLRLDRR				
HMGRclustalW{pseudomonas}	.....	.....	.....	.....
.....				
	Consensus	SE-----	-----PRP-N	EECLQIL--- -AEKGAKSLS
DEEIIKLVVA				

FIG. 322

651

700

```

HMGRclustalW{methanobac} GR..IKLYEI E.RHVPVDEA VRIRREFIE. ....RTCGVK
..LEHVSNYS
HMGRclustalW{methanococ} GE..IKPYQL D.KMFGSKIA TEIRRKFIE. ....KKVGIE
..FKHICNYS
HMGRclustalW{halobacter} GD..LRLHEL E.AHADADTA AEARRLLVE. ....SQSGAS
..LDAVGNYS
HMGRclustalW{sulfolobus} GE..ISFHEV D.NLLEANAA MVARRLALE. ....KIVGVG
..LPSIGSTV
HMGRclustalW{      yeast2} G..KLPLYSL EKKLEDTTTRA VLVRRKALST LAESPILVS.
...EKLPPFRN
HMGRclustalW{      yeast1} G..KLPLYAL EKKLGDTTTRA VAVRRKALSI LAEAPVLAS.
...DRLPYKN
HMGRclustalW{phycomycs} .....
.....
HMGRclustalW{  fusarium} G..KIPGYAL EKTLDGDFTRA VKIRRSIIAR NKAADITHS
LDRSKLPYEN
HMGRclustalW{  candida} G..KLPLYAL EKQLGDNLRA VAIRRKALSD LADAPVLRS.
...NKLPLYLH
HMGRclustalW{dictyoste2} A..VVAAAEK AATSGEDPSS IQPVVPPTSN LDFEGSLTN.
.....LPVDH
HMGRclustalW{wheat1} .....
.....
HMGRclustalW{      rice} G..ALPSHRL ESRLGDCRRA ARLRREALR. ....RVTGRG
..VEGLPPFDG
HMGRclustalW{  corn} G..KVPSYAL EARLGDCRRA AGIRREALR. ....RITGRD
..IEGLPLDG
HMGRclustalW{wheat3} .....
.....
HMGRclustalW{wheat2} .....
.....
HMGRclustalW{      soybean} .....
.....
HMGRclustalW{rubbertre3} G..SIPSYSL ESKLGNCKRA ALIRRETLO. ....RMSGRS
..LEGLPLDG
HMGRclustalW{rosyperiwi} G..KIPSYSL ESKLGDCKRA AGIRREALQ. ....RITGKS
..LEGLPLEG
HMGRclustalW{      tomato} G..KIPSYSL ESKLGDCKRA ASIRKEVMQ. ....RITGKS
..LEGLPLEG
HMGRclustalW{woodtobacc} G..KMPSYSL ESKLGDCKRA ASIRKEALQ. ....RITGKS
..LEGLPLEG
HMGRclustalW{      potato} G..KTPSYSL ESKLGDCKRA ASIRKEALQ. ....RITGKS
..LEGLPLEG
HMGRclustalW{radish} G..VVPYSYL ESRLGDCKRA ASIRREALQ. ....RLTGRS
..IEGLPLDG
HMGRclustalW{arabidopsis1} G..VIPSYSL ESRLGDCKRA ASIRREALQ. ....RVTGRS
..IEGLPLDG
HMGRclustalW{cucumismel} G..SVPSYSL ESKLGDCKRA ASIRREALQ. ....RTTGRS
..IHGLPFEG
HMGRclustalW{rubbertre2} .....
.....
HMGRclustalW{rubbertre1} G..KIPSYSL ESKLGDCKRA AAIRREALQ. ....RMTRRS
..LEGLPVEG
HMGRclustalW{camptothec} G..TTPSYAL ESKLGDCKRA AAIRREALQ. ....RMTKKS
..LAGLPLDG
HMGRclustalW{arabidops2} G..TIPSYSL ETKLGDCKRA AAIRREAVQ. ....RITGKS
..LTGLPLEG
HMGRclustalW{chineseham} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.
..LQYLPYRD

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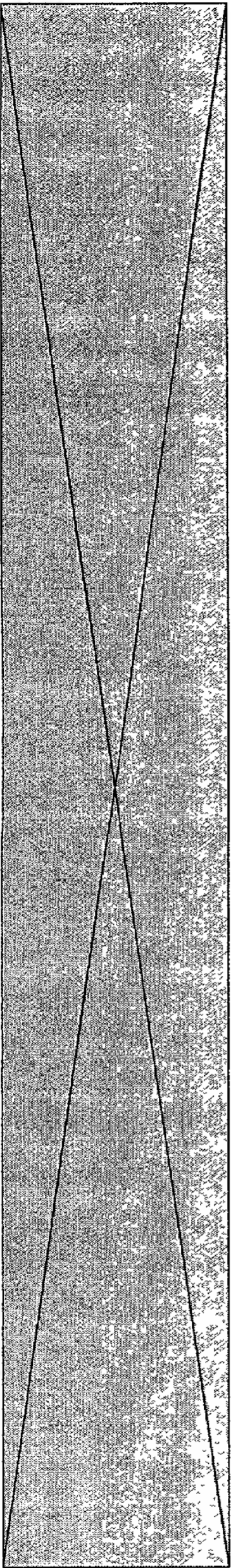
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HMGRclustalW{chineseha2} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.
..LQYLPYRD
HMGRclustalW{syrianhamst} K..HIPAYKL ETLMETHERG VSIRRQLLST K..LPEPSS.
..LQYLPYRD
HMGRclustalW{      rat} K..HIPAYKL ETLMETHERG VSIRRQLLSA K..LAEPSS.
..LQYLPYRD
HMGRclustalW{      rabbit} K..HIPAYKL ETLMETHERG VSIRRQLLSK K..LPEPSS.
..LQYLPYRD
HMGRclustalW{      human} K..HIPAYKL ETLMETHERG VSIRRQLLSK K..LSEPSS.
..LQYLPYRD
HMGRclustalW{      mouse} .....
.....
HMGRclustalW{      xenopus} K..HIPAYKL ETMMESPREG VAIRRQMLSD K..LPQRSA.
..LQSLPYKN
HMGRclustalW{sea urchin} K..HIPAYKL ENILDNPERG VAVRRQIISK L..LPITDA.
..LEKLPYAS
HMGRclustalW{cockroach} G..HIAGYQL EKVVNRNPERG VGIRRQILTK T..ADLKDA.
..LDNLPHYKN
HMGRclustalW{drosophila} GGTHCPLHKI ESVLDDPERG VRIRRQIIGS R..AKMPVGR
..LDVLPYEH
HMGRclustalW{dictyostel} G..EVLAYRL ENELGDCSRA VEIRRMLLEK ....QLSKK.
..IEPIPHEG
HMGRclustalW{schistosom} G..RLKTREL ESVVRNPFRA VELRRLDLS. ....TFLNNP
HIIERIPYKD
HMGRclustalW{archaeoglo} HYKSGKIRRA MSSRIPGFYK LSVEERLKKV AEFAGLSDEE
..VKAVLSQG
HMGRclustalW{pseudomonas} .....MS LDSRLPAFRN LSPAARLDHI GQLLGLSHDD
..VSLLANAG

Consensus G---IPSYSL ESKLGDCKRA VSIRREALSK K--LRITGSS --
LEGLPYEG

```

700 600 500 400 300 200 100



701

750

HMGRclustalW{methanobac}	IDMERASRRN IENPIGVVQI PLGVAGPLRV RGEHADGEYY
VPLATSEAL	
HMGRclustalW{methanococ}	IDEEMAMKKN IENMIGAIQI PLGFAGPLKI NGEYAKGEFY
IPLATTEGAL	
HMGRclustalW{halobacter}	FPAEAAES.A IENMVGSIQV PMGVAGPVSV DGGSVAGEKY
LPLATTEGAL	
HMGRclustalW{sulfolobus}	IDYSEIKNKN AENVIGAIQI PLGIVGPIRV NGDYAKGDFY
VPMATTEGAL	
HMGRclustalW{ yeast2}	YDYDRVFGAC CENVIGYMPI PVGVIGPLII DGT....SYH
IPMATTEGCL	
HMGRclustalW{ yeast1}	YDYDRVFGAC CENVIGYMPL PVGVIGPLVI DGT....SYH

IPMATTEGCL
 HMGRclustalW{phycomycetes}
 .PMATTEGCL
 HMGRclustalW{ fusarium} YNWERFFGAC CENVIGYMPL PVGVAGPLVI DGQ....SYF
 IPMATTEGVL
 HMGRclustalW{ candida} YDYDRVFGAC CENVIGYMPL PVGVAGPLII DGK....PYH
 IPMATTEGCL
 HMGRclustalW{dictyoste2} FDYTKVLGAC CENVIGYIPI PVGVAGPILL DGK....LVS
 IPMATTEGCL
 HMGRclustalW{wheat1}

 HMGRclustalW{ rice} MDYQAILGQC CEMPVGIVVQL PVGVAGPLLL DGR....EYH
 VPMATTEGCL
 HMGRclustalW{ corn} FDYASILGQC CELPVGIVVQL PVGVAGPLLL DGR....RFY
 LPMATTEGCL
 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3} FDYESILGQC CEMAIGYVQI PVGIAGPLLL DGK....EYT
 VPMATTEGCL
 HMGRclustalW{rosyperiwi} FDYASILGQC CEMPVGIVVQL PVGIAGPLLL DGR....EYM
 LPMATTEGCL
 HMGRclustalW{ tomato} FNYESILGQC CEMPIGYVQI PVGIAGPLLL NGK....EFS
 VPMATTEGCL
 HMGRclustalW{woodtobacc} FDYESILGQC CEMPIGYVQI PVGIAGPLLL DGR....EYS
 VPMATTEGCL
 HMGRclustalW{ potato} FDYSSILGQC CEMPVGIVVQI PVGIAGPLLL DGR....EYS
 VPMATTEGCL
 HMGRclustalW{radish} FDYDSILGQC CEMPVGIVQI PVGIAGPLLL DGY....EYS
 VPMATTEGCL
 HMGRclustalW{arabadosis1} FDYESILGQC CEMPVGIVQI PVGIAGPLLL DGY....EYS
 VPMATTEGCL
 HMGRclustalW{cucumismel} FDYESILGQC CEMPVGIVVQI PVGIAGPLLL DGF....EYT
 VPMATTEGCL
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1} FDYESILGQC CEMPVGIVVQI PVGIAGPLLL NGR....EYS
 VPMATTEGCL
 HMGRclustalW{camptothec} FDYDSILGQC CEMPVGIVVQI PVGIAGPLLL DGR....EYS
 VPMATTEGCL
 HMGRclustalW{arabados2} FDYNSILGQC CEMPVGIVVQI PVGIAGPLLL DGV....EYS
 VPMATTEGCL
 HMGRclustalW{chineseham} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DGK....EYQ
 VPMATTEGCL
 HMGRclustalW{chineseha2} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DGK....EYQ
 VPMATTEGCL
 HMGRclustalW{syrianhamst} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DGK....EYQ
 VPMATTEGCL
 HMGRclustalW{ rat} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DGK....EYQ
 VPMATTEGCL
 HMGRclustalW{ rabbit} YNYSLVLGAC CENVIGYMPI PVGVVGPLCL DGK....EFQ
 VPMATTEGCL
 HMGRclustalW{ human} YNYSLVMGAC CENVIGYMPI PVGVAGPLCL DEK....EFQ
 VPMATTEGCL
 HMGRclustalW{ mouse}

 HMGRclustalW{ xenopus} YNYSLVMGAC CENVIGYMPI PVGVAGPLLL NNK....EYQ

62/78

VPMATTEGCL		
HMGRclustalW{sea urchin}	YDYSFVSGAC	CENVIGYMPV PVGVAGPLLL DGQ....EFQ
VPMATTEGCL		
HMGRclustalW{ cockroach}	YDYLKVMGAC	CENVIGYMPV PVGVAGPLNL DGR....LVH
VPLATTEGCL		
HMGRclustalW{drosophila}	FDYRKVLNAC	CENVLGYVPI PVGYAGPLLL DGE....TYY
VPMATTEGAL		
HMGRclustalW{dictyostel}	FDFAKVQGQC	CENVIGYVPI PVGTAGPIQL NGQ....LVT
IPMATTEGCL		
HMGRclustalW{schistosom}	YDYRLVYGQC	CEEVIGYMPI PVGKIGPLLL DGR....SHY
IPLATTEGCL		
HMGRclustalW{archaeoglo}	.LPLDVADRM	IENVIGTFEL PLGIATNFLI DGK....DYL
IPMAIEEPSV		
HMGRclustalW{pseudomonas}	ALPMDIANGM	IENVIGTFEL PYAVASNFQI NGR....DVL
VPLVVEEPSI		
	Consensus	FDY-SVLG-C CENVIGY--I PVGVAGPLLL DGK----EYS

VPMATTEGCL

HMGCoA binding

E

FIG.32EE

751

800
 HMGRclustalW{methanobac} VASVNRGCSV ITRAGGATVR VTGDSMT.RA PVIRTGSVVE
 ALQLREWIYE
 HMGRclustalW{methanococ} VASVNRGCSI ITKCGGATVR VIDDKMT.RA PCLKTKSVVD
 AIKVRDWIRE
 HMGRclustalW{halobacter} LASVNRGCSV INSAGGATAR VLKSGMT.RA PVFRVADVAE
 AEALVSWTRD
 HMGRclustalW{sulfolobus} IASVNRGIKA VTLSGGVRAK VLKDEMT.RA PVFKFDSIEQ
 IPNFLKFIEE
 HMGRclustalW{ yeast2} VASAMRGCKA INAGGGATTV LTKDGMT.RG PVVRFPTLIR
 SGACKIWLDLDS
 HMGRclustalW{ yeast1} VASAMRGCKA INAGGGATTV LTKDGMT.RG PVVRFPTLKR
 SGACKIWLDLDS
 HMGRclustalW{phycomycs} VASTARGCKA INAGGGASTI VIADGMT.RG PCVEFPTILR
 AAACKLWIEN
 HMGRclustalW{ fusarium} VASASRGCKA INSGGGAITV LTADGMT.RG PCVAFETLER
 AGAAKLWLDLDS
 HMGRclustalW{ candida} VASAMRGCKA INLGGGVTTV LTKDGMT.RG PCVKFPSLKR
 AGQCKLWLDLDS
 HMGRclustalW{dictyoste2} VASTHRGAKA ITKSGGAKTV LLQSGMT.RA PVCRLPSSIR
 AGELKQWIEN
 HMGRclustalW{wheat1}

 HMGRclustalW{ rice} VASVNRVQGG HLVSGGAFSV LLRDAMS.RA PAVKLPCPMR
 AAELKAFAEA
 HMGRclustalW{ corn} VASTNRGCKA IAESGGATSV VLRDAMT.RA PVARFPTARR
 AAELKAFLED
 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3} VASANRGCKA IYASGGATSV LLRDGMT.RA PVVRFPTAKR
 AADLKFFMED
 HMGRclustalW{rosyperiw} VASTNRGCKA ILASGGANSV LLRDGMT.RA PVVRFGTAKR
 AAELKFYMED
 HMGRclustalW{ tomato} VASTNRGCKA IYASGGATCI LLRDGMT.RA PCVRFGTAKR
 AAELKFFVED
 HMGRclustalW{woodtobacc} VASTNRGCKA IYASGGATSV LLRDGMT.RA PCVRFGTAKR
 AAELKFFVED
 HMGRclustalW{ potato} VASTNRGCKA IFVSGGADSV LLRDGMT.RA PVVRFTTAKR
 AAELKFFVED
 HMGRclustalW{radish} VASTNRGCKA MYVSGGATST VLKDEMT.RA PVVRFASARR
 ASELKFFLES
 HMGRclustalW{arabadopsis1} VASTNRGCKA MFISGGATST VLKDEMT.RA PVVRFASARR
 ASELKFFLEN
 HMGRclustalW{cucumismel} VASTNRGCKA IYASGGATSM LLKDEMT.RA PVVRFSGAKR
 ASELKFFLED
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1} VASTNRGCKA IYLSGGATSV LLKDEMT.RA PVVRFASATR
 AAELKFFLED
 HMGRclustalW{camptothec} VASTNRGCKA IFACGGATSV LLRDAMT.RA PVVRFSGAKR
 AADLKFFLEN
 HMGRclustalW{arabadops2} VASTNRGCKA IHLSSGGAFSV LVKDAMT.RA PVVRFPSARR
 AALVMFYLQD
 HMGRclustalW{chineseham} VASTNRGCRA IGLGGGASSR VLADGMT.RG PVVRLPRACD
 SAEVKAWLET

64/78

HMGRclustalW{chineseha2}	VASTNRGCRA	IGLGGGASSR	VLADGMT.RG	PVVRLPRACD
SAEVKAWLET				
HMGRclustalW{syrianhamst}	VASTNRGCRA	IGLGGGASSR	VLADGMT.RG	PVVRLPRACD
SAEVKAWLET				
HMGRclustalW{rat}	VASTNRGCRA	ISLGGGASSR	VLADGMS.RG	PVVRLPRACD
SAEVKSWLET				
HMGRclustalW{rabbit}	VASTNRGCRA	ICLGGGASSR	VLADGMT.RG	PVVRLPRACD
SAEVKAWLET				
HMGRclustalW{human}	VASTNRGCRA	IGLGGGASSR	VLADGMT.RG	PVVRLPRACD
SAEVKAWLET				
HMGRclustalW{mouse}	.....	.....	.....	.....
.....				
HMGRclustalW{xenopus}	VASTNRGCRA	IMLGGGAKSR	VLADGMT.RG	PVVRLPTACD
AAEVKAWLDS				
HMGRclustalW{sea urchin}	VASTNRGCRA	LRSAGGIHSV	LIGDGMT.RG	PLVRLPSAQE
AGAIKQWLEV				
HMGRclustalW{cockroach}	VASTNRGMRA	LMRCG.VTSR	IVADGMT.RG	PVVRFPNIDR
ASEAMLWMQV				
HMGRclustalW{drosophila}	VASTNRGCKA	LSVRG.VRSV	VEDVGMT.RA	PCVRFPSVAR
AAEAKSWIEN				
HMGRclustalW{dictyostel}	VASTHRGCKA	ITESGGAKCT	ITSRGMT.RA	PVVRFSDIVK
ASEFVSWIND				
HMGRclustalW{schistosom}	VASTNRGCRA	IFLAGGIKSV	VYRDQMT.RA	PVWVFPSIID
SVKCIWIDS				
HMGRclustalW{archaeoglo}	VAAASNAARM	ARESGGFTTD	YTGSLMIGQI	QVTKLLNPNA
AKFEVLRQKD				
HMGRclustalW{pseudomonas}	VAAASYMAKL	ARANGGFTTS	SSAPLMHAQV	QIVGIQDPLN
ARLSLLRRKD				
	Consensus	VASTNRGCKA	I-LSGGATSV	VLADGMT-RA
AAELKFWLED				PVVRFPSAKR

FIG. 3266

850
 HMGRclustalW{methanobac} NM..DALREE AESTTRHGKL VKIDPI.... IVAGSYVYPR
 FVYTTGDSMG
 HMGRclustalW{methanococ} NF..ERIKEV AESTTRHGKL IKIEPI.... LIVGRNLYPR
 FVFKTGDMG
 HMGRclustalW{halobacter} NF..AALKEA AEETTNGHGL LDVTP..... YVVGNSVYLR
 FRYDTKDAMG
 HMGRclustalW{sulfolobus} NL..EKIRNI ANSTSHHGKL KSITP..... FVLGNNVWLR
 FSFETGDAMG
 HMGRclustalW{ yeast2} EEGQNSIKKA FNSTSRFARL QHIQT..... CLAGDLLFMR
 FRTTTGDAMG
 HMGRclustalW{ yeast1} EEGQNAIKKA FNSTSRFARL QHIQT..... CLAGDLLFMR
 FRTTTGDAMG
 HMGRclustalW{phycomyces} EG.NDIVTNA FNSTSRFARL RKLKI..... ALAGKLVFIR
 FSTTTGDAMG
 HMGRclustalW{ fusarium} EAGQDMMKKA FNSTSRFARL QSMKT..... ALAGTNLYIR
 FKTTTGDAMG
 HMGRclustalW{ candida} DEGQEEMKKA FNSTSRFARL QHLQT..... ALAGDLLFIR
 FRTVTGDAMG
 HMGRclustalW{dictyoste2} QENFYQVASA FNSTSRFARL KSIKV..... VIAGRLVYLR
 FKSSTGDAMG
 HMGRclustalW{wheat1}
GDAMG
 HMGRclustalW{ rice} PANFELLA AV FNRSSRFARL QDIRC..... ALAGRNLYMR
 FSCITGDAMG
 HMGRclustalW{ corn} PANFDTLSVV FNRSSRFARL QGVQC..... AMAGRNLYMR
 FSCSTGDAMG
 HMGRclustalW{wheat3}
GDAMG
 HMGRclustalW{wheat2}
GDAMG
 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3} PDNFDTI AVV FNKSSRFARL QSVQC..... AIAGKNLYMR
 FSCSTGDAMG
 HMGRclustalW{rosyperiwi} TQNFETISVV FNKSSRFARL QSVQC..... AIAGKNLYIR
 FSCSTGDAMG
 HMGRclustalW{ tomato} PIKFESLANV FNQSSRFARL QRIQC..... AIAGKNLYMR
 LCCSTGDAMG
 HMGRclustalW{woodtobacc} PVKFETLAAV FNQSSRFARL QRIQC..... AIAGKNLYMR
 FVCSTGDAMG
 HMGRclustalW{ potato} PLNFETLSLM FNKSSRFARL QGIQC..... AIAGKNLYIT
 FSCSTGDAMG
 HMGRclustalW{radish} PENFETLAVV FNRSSRFARL QSVMC..... TLAGKNAYVR
 FSCSTGDAMG
 HMGRclustalW{arabadopsis1} PENFDTLAVV FNRSSRFARL QSVKC..... TIAGKNAYVR
 FCCSTGDAMG
 HMGRclustalW{cucumismel} PSNFDTLAVV FNRSSRFARL QSIRC..... SIAGKNLYVR
 FCCSTGDAMG
 HMGRclustalW{rubbertre2}

 HMGRclustalW{rubbertre1} PDNFDTLAVV FNKSSRFARL QGIKC..... SIAGKNLYIR
 FSCSTGDAMG
 HMGRclustalW{camptothec} PLNFETLAAV FNSSSRFGKL QNIKC..... AIAGKNLYMR
 YSCSTGDAMG
 HMGRclustalW{arabadops2} PSNFERLSLI FNKSSRFARL QSITC..... TIAGRNLYPR
 FACSTGDAMG
 HMGRclustalW{chineseham} PEGFAVIKDA FDSTSRFARL QKLHV..... TMAGRNLYIR
 FQSKTGDAMG

66/78

HMGRclustalW{chineseha2}	PEGFAVIKDA	FDSTSRFARL	QKLHV.....	TMAGRNLVIR
FQSKTGDAMG				
HMGRclustalW{syrianhamst}	PEGFAVIKDA	FDSTSRFARL	QKLHV.....	TMAGRNLVIR
FQSKTGDAMG				
HMGRclustalW{rat}	PEGFAVVKEA	FDSTSRFARL	QKLHV.....	TLAGRNLVIR
LQSKTGDAMG				
HMGRclustalW{rabbit}	PEGFAVIKEA	FDSTSRFARL	QKLHI.....	SMAGRNLVIR
FQSRTGDAMG				
HMGRclustalW{human}	SEGFAVIKEA	FDSTSRFARL	QKLHT.....	SIAGRNLVIR
FQSRSGDAMG				
HMGRclustalW{mouse}	.....	.....	.....	.....
.....				
HMGRclustalW{xenopus}	AEGFKVIKDA	FDSTSRFARL	GRLQN.....	CVAGRNLVIR
FQSKTGDAMG				
HMGRclustalW{sea urchin}	PENFAAIKER	FESTSRFAKL	KSIQT.....	ALAGRYMFLR
FKALTGDAMG				
HMGRclustalW{cockroach}	PYNFEQIKKN	FDSTSRFARL	SKIHI.....	RVAGRHLFIR
FIATTGDAMG				
HMGRclustalW{drosophila}	DENYRVVKTE	FDSTSRFGRL	KDCHI.....	AMDGPQLVIR
FVAITGDRMG				
HMGRclustalW{dictyostel}	TDNYQALKAV	FDSTSRFARL	SAIKC.....	TIAGRSVYIR
FKCDTGDAMG				
HMGRclustalW{schistosom}	EEGFQTLKSA	FDKTSAHVNL	LSVFA.....	CPAGRYIHIR
FAARTGDAMG				
HMGRclustalW{archaeoglo}	EIIERANECD	PMLVNLGGGC	KDIEAR.VID	TIMGKMLIVH
LIVDVKDAMG				
HMGRclustalW{pseudomonas}	EIIELANRKD	QLLNSLGGGC	RDIEVHTFAD	TPRGPMVAH
LIVDVRDAMG				
	Consensus	PENFETLK-A	FNSTSRFARL	QSIQC----- AIAGRNLVIR
FSCSTGDAMG				

NADH binding domain 1

(continued)

FIG. 32II

900
 HMGRclustalW{methanobac} MNMVTIATER ALELLT...R ETGAHV..IA LSGNLCTDKK
 PAAVNLIIEGR
 HMGRclustalW{methanococ} MNMVTIATEK ACNFIEGELK KEGIFVKTVA VSGNACVDKK
 PSGMNLINGR
 HMGRclustalW{halobacter} MNMATIATEA VCGVVE...A ETAASL..VA LSGNLCSDKK
 PAAINAVEGR
 HMGRclustalW{sulfolobus} MNMVTIAVEK VCEFIE.... ENFPSADCLA VSGNMCSDKK
 QTNVNSLFGR
 HMGRclustalW{ yeast2} MNMISKGVEY SLKQMVVEY. .GWEDMEVVS VSGNYCTDKK
 PAAINWIEGR
 HMGRclustalW{ yeast1} MNMISKGVEY SLKQMVVEY. .GWEDMEVVS VSGNYCTDKK
 PAAINWIEGR
 HMGRclustalW{phycomycs} MNM.....

 HMGRclustalW{ fusarium} MNMISKGVEH ALSVMANDG. .GFDDMQIIS VSGNYCTDKK
 AAALNWIDGR
 HMGRclustalW{ candida} MNMISKGVEY ALKQMTEVF. .GWDDMMVVS VSGNYCTDKK
 PAAVNWINGR
 HMGRclustalW{dictyoste2} MNMVSKGVEK ALEVITEY.. ..FPMEVLS LSGNVCTDKK
 PSSINWLEGR
 HMGRclustalW{wheat1} MNMVSKGVEN VLGYIRNN.. ..FPDMDVIS ISGNYCSDKK
 ATAVNWIDGR
 HMGRclustalW{ rice} MNMVSKGVEN VLGYLQNV.. ..FPDMDVIS VSGNYCSDKK
 PTAVNWIEGR
 HMGRclustalW{ corn} MNMVSKGVQN VLDLQDD.. ..FHDMDVIS ISGNFCSDKK
 PSAVNWIEGR
 HMGRclustalW{wheat3} MNMISKGVN VLDYLQDD.. ..FPDMDVIS ISGNFCSDKK
 PAAVNWIEGR
 HMGRclustalW{wheat2} MNMISKGVQH VLDYLEED.. ..FPDMDVVS ISGNFCSDKK
 SAAVNWIEGR
 HMGRclustalW{ soybean}

 HMGRclustalW{rubbertre3} MNMVSKAVQN VIDYLQND.. ..FPDMDVIG LTGNFCADKK
 AAAVNWIEGR
 HMGRclustalW{rosyperiwi} MNMVSKGVQN VLEFLQTD.. ..YPDMDVLG ISGNFCADKK
 PAAVNWIEGR
 HMGRclustalW{ tomato} MNMVSKGVQN VLDYLQNE.. ..YPDMDVIG ISGNFCSDKK
 PAAVNWIEGR
 HMGRclustalW{woodtobacc} MNMVSKGVQN VLDYLQNE.. ..YPDMDVIG ISGNFCSDKK
 PAAVNWIEGR
 HMGRclustalW{ potato} MNMVSKGVQN VLDYLQSE.. ..YPDMDVIG ISGNFCSDKK
 PAAVNWIEGR
 HMGRclustalW{radish} MNMVSKGVQN VLEFLTED.. ..FPDMDVIG ISGNFCSDKK
 PAAVNWIEGR
 HMGRclustalW{arabadopsis1} MNMVSKGVQN VLEYLTDD.. ..FPDMDVIG ISGNFCSDKK
 PAAVNWIEGR
 HMGRclustalW{cucumismel} MNMVSKGVQN VLEFLQHD.. ..FSDMEVIG ISGNFCADKK
 PAAVNWIEGR
 HMGRclustalW{rubbertre2}LESD.. ..FADMDVIG ISGNFCSDKK
 PAAVNWIEGR
 HMGRclustalW{rubbertre1} MNMVSKGVQN VLEFLQSD.. ..FSDMDVIG ISGNFCSDKK
 PAAVNWIEGR
 HMGRclustalW{camptothec} MNMISKGVN VLDLQDD.. ..FPDMDVIG ISGNYCSDKK
 PAAVNWIEGR
 HMGRclustalW{arabadops2} MNMVSKGVQN VLDFVKSE.. ..FPDMDVIG ISGNYCSDKK
 ASAVNWIEGR
 HMGRclustalW{chineseham} MNMISKGTEK ALLKLQEF.. ..FPQMILA VSGNYCTDKK
 PAAINWIEGR

68/78

HMGRclustalW{chineseha2}	MNMISKGTEK ALLKLQEF.. ..FPQMILA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{syrianhamst}	MNMISKGTEK ALVKLQEF.. ..FPQMILA VSGNYCTDKK
PAAVNWIEGR	
HMGRclustalW{ rat}	MNMISKGTEK ALLKLQEG.. ..VPELQILA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{ rabbit}	MNMISKGTEK ALSKLHEY.. ..FPQMILA VSGNYCTDKK
PAAVNWIEGR	
HMGRclustalW{ human}	MNMISKGTEK ALSKLHEY.. ..FPQMILA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{ mouse}	.....EK ALLKLQEF.. ..FPDMQILA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{ xenopus}	MNMISKVTEQ ALARLQEE.. ..FPDLHVLA VSGNYCTDKK
PAAINWIEGR	
HMGRclustalW{sea urchin}	MNMISKGTEQ ALHALQTM.. ..FPNIEIMS LSGNYCTDKK
VAAINWIEGR	
HMGRclustalW{ cockroach}	MNMLSKGTEV ALAYVQQV.. ..YPDMEILS LSGNFCTDKK
PAAVNWIEGR	
HMGRclustalW{drosophila}	MNMVSKALRW PFAEFTLH.. ..FPDMQIIS LSGNFCCDKK
PAAINWIKGR	
HMGRclustalW{dictyostel}	MNMVSKGVEA VLEHLKII.. ..FDDMTLLS ISGNMCTDKK
PSSINWTEGR	
HMGRclustalW{schistosom}	MNMVSKATDS ALHCLKKY.. ..FSNMQVIS LSGNMCTDKK
PATINTILGR	
HMGRclustalW{archaeoglo}	ANAVNTMCEK VAPFIERITG .GKVYLRIIS NLAAYRLARA
KAVFDKDVIG	
HMGRclustalW{pseudomonas}	ANTVNTMAEA VAPLMEAITG .GQVRLRILS NLADLRLARA
QVRITPQQLE	
Consensus	MNMVSKGVEN VL--LQED-- -GFPDMDVIS ISGNYCTDKK
PAAVNWIEGR	

NADH binding domain 1 (concluded)

FIG. 32 KK

1990-1991		1991-1992		1992-1993		1993-1994		1994-1995		1995-1996		1996-1997		1997-1998		1998-1999		1999-2000		2000-2001		2001-2002		2002-2003		2003-2004		2004-2005		2005-2006		2006-2007		2007-2008		2008-2009		2009-2010		2010-2011		2011-2012		2012-2013		2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020		2020-2021		2021-2022		2022-2023		2023-2024		2024-2025		2025-2026		2026-2027		2027-2028		2028-2029		2029-2030		2030-2031		2031-2032		2032-2033		2033-2034		2034-2035		2035-2036		2036-2037		2037-2038		2038-2039		2039-2040		2040-2041		2041-2042		2042-2043		2043-2044		2044-2045		2045-2046		2046-2047		2047-2048		2048-2049		2049-2050		2050-2051		2051-2052		2052-2053		2053-2054		2054-2055		2055-2056		2056-2057		2057-2058		2058-2059		2059-2060		2060-2061		2061-2062		2062-2063		2063-2064		2064-2065		2065-2066		2066-2067		2067-2068		2068-2069		2069-2070		2070-2071		2071-2072		2072-2073		2073-2074		2074-2075		2075-2076		2076-2077		2077-2078		2078-2079		2079-2080		2080-2081		2081-2082		2082-2083		2083-2084		2084-2085		2085-2086		2086-2087		2087-2088		2088-2089		2089-2090		2090-2091		2091-2092		2092-2093		2093-2094		2094-2095		2095-2096		2096-2097		2097-2098		2098-2099		2099-2100		2100-2101		2101-2102		2102-2103		2103-2104		2104-2105		2105-2106		2106-2107		2107-2108		2108-2109		2109-2110		2110-2111		2111-2112		2112-2113		2113-2114		2114-2115		2115-2116		2116-2117		2117-2118		2118-2119		2119-2120		2120-2121		2121-2122		2122-2123		2123-2124		2124-2125		2125-2126		2126-2127		2127-2128		2128-2129		2129-2130		2130-2131		2131-2132		2132-2133		2133-2134		2134-2135		2135-2136		2136-2137		2137-2138		2138-2139		2139-2140		2140-2141		2141-2142		2142-2143		2143-2144		2144-2145		2145-2146		2146-2147		2147-2148		2148-2149		2149-2150		2150-2151		2151-2152		2152-2153		2153-2154		2154-2155		2155-2156		2156-2157		2157-2158		2158-2159		2159-2160		2160-2161		2161-2162		2162-2163		2163-2164		2164-2165		2165-2166		2166-2167		2167-2168		2168-2169		2169-2170		2170-2171		2171-2172		2172-2173		2173-2174		2174-2175		2175-2176		2176-2177		2177-2178		2178-2179		2179-2180		2180-2181		2181-2182		2182-2183		2183-2184		2184-2185		2185-2186		2186-2187		2187-2188		2188-2189		2189-2190		2190-2191		2191-2192		2192-2193		2193-2194		2194-2195		2195-2196		2196-2197		2197-2198		2198-2199		2199-2200		2200-2201		2201-2202		2202-2203		2203-2204		2204-2205		2205-2206		2206-2207		2207-2208		2208-2209		2209-2210		2210-2211		2211-2212		2212-2213		2213-2214		2214-2215		2215-2216		2216-2217	
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950

38

FIG. 32L

70/78

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AG..SIGGYN
  HMGRclustalW{chinese2} GKTVVCEAVI PAKVVREVLK TTTEAMIDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{syrianhamst} GKTVVCEAVI PARVVREVLK TTTEAMIDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      rat} GKTVVCEAVI PAKVVREVLK TTTEAMVDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      rabbit} GKTVVCEAVI PAKVVREVLK TTTEAMIDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      human} GKSVVCEAVI PAKVVREVLK TTTEAMIEVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      mouse} GKTVVCEAVI PAKVVREVLK TTTEAMVDVN INKNLVGSAM
AG..SIGGYN
  HMGRclustalW{      xenopus} GKSVVCEAII PAKVVREVLK SSTEALVEVN INKNFIGSAM
AG..SIGGYN
  HMGRclustalW{sea urchin} GKSVVCEATV PAHIVQQVLK TSASALVDLN IHKNLVGSAM
AG..SIGGFN
  HMGRclustalW{cockroach} GKSVVCEAIV PADIISVLK TSVQALMDVN ITKNLIGSAV
AG..SIGGFN
  HMGRclustalW{drosophila} GKRVTCTI SAATLRSLK TDAKTLVECN KLKNMGGSAM
AG..SIGGNN
  HMGRclustalW{dictyostel} GRSVVCEAMI TGDVVQRLK TNVQALVDLN IAKNLIGSAM
AG..SIGGFN
  HMGRclustalW{schistosom} GKSVIAEHL SADVLAQVLH TNAQRLARLT HSKNWIGSAM
AGCPGMMGCN
  HMGRclustalW{archaeoglo} .....GEEVV EGIMLAYAFA AADPFRCATH NKGIMNGISA
LM.....
  HMGRclustalW{pseudomonas} TAEFSGEAVI EGILDAYAFA AVDPYRAATH NKGIMNGIDP
LI.....

                Consensus GKSVVCEAVI PAEVVRKVLK TTVEALVELN ILKNLVGSAM AG--
SLGGFN

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K

FIG. 32MM

71/78

951

1000
 HMGRclustalW{methanobac} AHYANIIGAI FLATGQDEAH IVEGSLGVTI AEERK.....
GDLYF
 HMGRclustalW{methanococ} AHYANIIGAI FLATGQDEAH IVEGSLGITM AEVED.....
DGLYF
 HMGRclustalW{halobacter} AHVANVVAAM FLATGQDEAQ VVEGANAITT AEVQD.....
GDLYV
 HMGRclustalW{sulfolobus} AHFANIVTAI FIATGQDVAQ IVESSSGYTW TEVRG.....
EDLYI
 HMGRclustalW{ yeast2} AHAANLVTAL FLALGQDPAQ NVESSNCITL MKEVD.....
GDLRI
 HMGRclustalW{ yeast1} AHAANLVTAV FLALGQDPAQ NVESSNCITL MKEVD.....
GDLRI
 HMGRclustalW{phycomyc}

 HMGRclustalW{ fusarium} AHAANIVAAI FLATGQDPAQ VVESANCITI MKNLN.....
GALQI
 HMGRclustalW{ candida} AQAANMVTAV YLALGQDPAQ NVESSNCITL MTETED....
GDLKV
 HMGRclustalW{dictyoste2} AHASNIVTAL YIATGQDPAQ NVESSNCITL MESINGG...
KDLVI
 HMGRclustalW{wheat1} AHASNIATAL FIATGQDPAQ NVESSQCITM LEAVNEG...
KDLHI
 HMGRclustalW{ rice} AHASNIVTAL FIATGQDPAQ NVESSQCITM LEEVNDG...
DDLHI
 HMGRclustalW{ corn} AHASNIVTAI FIATGQDPAQ NVESSHCITM LEPVNAG...
RDLHI
 HMGRclustalW{wheat3} AHASNIVTAI FIATGQDPAQ NVESSQCIAM LEAVNDG...
KDLHI
 HMGRclustalW{wheat2} AHASNIVSAI FIATGQDPAQ NVESSQCITM LEAVNGG...
RDLHI
 HMGRclustalW{ soybean} AHASNIVSAI FIATGQDPAQ NVESSHCITM MEAVNDG...
RDLHI
 HMGRclustalW{rubbertre3} AHASNMVTAV YIATGQDPAQ NVESSHCITM MEAVNDG...
KDLHI
 HMGRclustalW{rosyperiwi} AHASNIVSAI FIATGQDPAQ NVESSQCITM MEAVNDG...
KDLHI
 HMGRclustalW{ tomato} AHASNIVSAV FIATGQDPAQ NIESSHCITM MEAVNDG...
KDLHI
 HMGRclustalW{woodtobacc} AHASNIVSAV YIATGQDPAQ NIESSHCITM MEAVNDG...
KDLHV
 HMGRclustalW{ potato} AHASNIVSAV YLATGQDPAQ NVESSHCITM MEAVNDG...
KDLHV
 HMGRclustalW{radish} RHASNIVSAV FLATGQDPAQ NVESSQCITM MEAVNDG...
KDIHI
 HMGRclustalW{arabadopsis1} AHASNIVSAV FIATGQDPAQ NVESSQCITM MEAVNDG...
KDIHI
 HMGRclustalW{cucumismel} AHSSNIVSAI FLATGQDPAQ NVESSHCITM MEPVNNG...
RDLHI
 HMGRclustalW{rubbertre2} AHAGNIVSAI FIATGQDPAQ NVESSHCITM MEAVNDG...
KDLHI
 HMGRclustalW{rubbertre1} AHAGNIVSAI FIATGQDPAQ NVESSHCITM MEAVNDG...
KDLHI
 HMGRclustalW{camptothec} AHASNIVSAV YLATGQDPAQ NVESSHCITM MEAVNDG...
KDLHV
 HMGRclustalW{arabadops2} AHSSNIVSAV FIATGQDPAQ NVESSHCITM ILPDGD....
DLHI
 HMGRclustalW{chineseham} AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..

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.....EDLYI
  HMGRclustalW{chineseha2}  AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
  HMGRclustalW{syrianhamst} AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
  HMGRclustalW{      rat}   LHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
  HMGRclustalW{      rabbit} AHAANYVTAI YIACGQDAAQ NVGSSNCITL MEASGPPN..
.....EDLYI
  HMGRclustalW{      human}  AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
  HMGRclustalW{      mouse}  AHAANIVTAI YIACGQDAAQ NVGSSNCITL MEASGPTN..
.....EDLYI
  HMGRclustalW{  xenopus}    AHAANIVTAI YIACGQDAAQ NVGSSNCITI MEATGPTY..
.....EDLYI
  HMGRclustalW{sea urchin}   AHAANIVTAI YIATGQDAAQ NIASSNCMTL METRGPKG..
.....GDLYL
  HMGRclustalW{ cockroach}   AHAANIVTAI FIATGQDPAQ NVGSSNCMTL MEPWGEDG..
.....KDLYV
  HMGRclustalW{drosophila}   AHAANMVTAV FLATGQDPAQ NVTSSNCSTA MECWAENS..
.....EDLYM
  HMGRclustalW{dictyoste1}   AHASNIVTAI FLATGQDCAQ NVESSNCITQ MEACNDG...
.....QDLYI
  HMGRclustalW{schistosom}   AHAANIIAGM FAATGQDLAQ VVDSSSCLTQ LEVDLSD...
.....DSLVA
  HMGRclustalW{archaeoglo}   ..... .IATGNDFRA IEAGAHSYAA IGG.YKPLTT
YEVDKGNLV
  HMGRclustalW{pseudomonas} ..... .VATGNDWRA VEAGAHAYAC RSGHYGSLTT
WEKDNNGHLV

                                Consensus AHAANIVTAI FIATGQDPAQ NVESSNCITM MEAVNDGN-- -----
KDLHI

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D

1001

1050
 HMGRclustalW{methanobac} AVNLPDVPLA TVGGGTGLET ASECLDIMGV RGGG.....
 RVHAFAEIVG
 HMGRclustalW{methanococ} SVTLPDVPIG TVGGGTRVET QKECLEMLGC YGDN.....
 KALKFAEIVG
 HMGRclustalW{halobacter} SVSIASLEVG TVGGGTKLPT QSEGLDILGV SGGGDP.AGS
 NADALAECIA
 HMGRclustalW{sulfolobus} SVTLPSLEVG TVGGGTRLPT QKEALSIMGV YGSGNP.PGS
 NAKKLAEIIA
 HMGRclustalW{ yeast2} SVSMPSIEVG TIGGGTVLEP QGAMLDLLGV RGPHTPEPGA
 NARQLARIIA
 HMGRclustalW{ yeast1} SVSMPSIEVG TIGGGTVLEP QGAMLDLLGV RGPHTAPGT
 NARQLARIVA
 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} SVSMPSLEVG TLGGGTILEP QGAMLDILGV RGSHTPTNPGD
 NARRLARIIG
 HMGRclustalW{ candida} SVSMPSIEVG TIGGGTILDP QGSMLLELLGV RG.PADVPEGE
 NARQLAKIVA
 HMGRclustalW{dictyoste2} SVTMPSIEVG TVGGGTHLPA QSACLDLLKI RGANLERPGA
 NSEQLARVVA
 HMGRclustalW{wheat1} SVTMPPIEV.

 HMGRclustalW{ rice} SVTMPSIEVG TIGGGTCLAS QAACLNLLGV KGSNHGSPGA
 NAGRLATIVA
 HMGRclustalW{ corn} SVTMPSIEVG TVGGGTQLAS QSACLDLLGV RGASRDRPGS
 NARLLATVVA
 HMGRclustalW{wheat3} SVTMPPIEV.

 HMGRclustalW{wheat2} SVTMPPIEV.

 HMGRclustalW{ soybean} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGS
 NSRLLATIVA
 HMGRclustalW{rubbertre3} SVSMPSIELG TVGGGTQLAS QSACLNLLGV KGASKDSPGS
 NSRLLATIVA
 HMGRclustalW{rosyperiwi} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKDSPGA
 NSRLLATIVA
 HMGRclustalW{ tomato} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANREAPGS
 NARLLATVVA
 HMGRclustalW{woodtobacc} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANREVPGS
 NARLLATIVA
 HMGRclustalW{ potato} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANRDAPGS
 NARLLATIVA
 HMGRclustalW{radish} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGM
 NSRRLATIVA
 HMGRclustalW{arabadopsis1} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASTESPGM
 NARRLATIVA
 HMGRclustalW{cucumismel} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKESPGA
 NSRLLATIVA
 HMGRclustalW{rubbertre2} SVTLPSIEVG TVGGGTQLAS QSACLNLLGV MGACKESPGS
 YSRLLATIVA
 HMGRclustalW{rubbertre1} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGANKEPGS
 NSRLLAAIVA
 HMGRclustalW{camptothec} SVTMPSIEVG TVGGGTQLAS QSACLNLLGV KGASKEAPGS
 NARLLATIVA
 HMGRclustalW{arabadops2} SVSMPCIEVG TVGGGTQLAS QAACLNLLGV KGSNNEKPGS
 NAQQLARIVA
 HMGRclustalW{chineseham} SCTMPSIEIG TVGGGTNLLP QQACLQMLGV QGACKDNPGE
 NARQLARIVC

74/78

HMGRclustalW{chineseha2}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{syrianhamst}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{rat}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{rabbit}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDSPGE
NARQLARIVC				
HMGRclustalW{human}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{mouse}	SCTMPSIEIG	TVGGGTNLLP	QQACLQMLGV	QGACKDNPGE
NARQLARIVC				
HMGRclustalW{xenopus}	SCTMPSIEIG	TVGGGTNLAP	QQACLQMLGV	QGASTETPGK
NACQLAQIVC				
HMGRclustalW{sea urchin}	SCTMPSIELG	TVGGGTVLPP	QSACLQMDV	KGSNIHGSG
NASQLARIVC				
HMGRclustalW{cockroach}	SCTMPSIEIG	TIGGGTVLPP	QAACLDMLGV	RGANEMCPGE
NANTLARIVC				
HMGRclustalW{drosophila}	TCTMPSIEVG	TVGGGTGLPG	QSACLEMLGV	RGAHATRPGE
NAKKLAQIVC				
HMGRclustalW{dictyostel}	TVTMSPIEVG	TVGGGTSLPA	QSACLDIIGV	KGSSSSKPGA
NADQLAKTIA				
HMGRclustalW{schistosom}	SVTMPCLEVG	TVGGGTRLSP	QRACLDLLDL	SV.....D.R
PTEHLSRIIA				
HMGRclustalW{archaeoglo}	GTIEIPMAVG	VIGGATKVN	LAKISLKILG	VNTAEELARV AAAL
HMGRclustalW{pseudomonas}	GTLEMPMPVG	LVGGATKTHP	LAQLSLRILG	VKTAQALAEI AVAV
	Consensus	SVTMPSIEVG	TVGGGTQLAP	QSACLNLLGV KGA-KESPGS
NARQLARIVA				

NADH binding domain 2

FIG.32 QQ

1051

1100

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HMGRclustalW{methanobac} GAVLAGELSL MGALAAGHLA RAHSELGRG. ....
.....
HMGRclustalW{methanococ} AAVLAGELSL LGALAAGHLG KAHQELGR.. ....
.....
HMGRclustalW{halobacter} VGSLAGELSL LSALASRHLS SAHAELGR.. ....
.....
HMGRclustalW{sulfolobus} STVLSGELNL LAALSNKELG KAHAKLGRAM KV.....
.....
HMGRclustalW{      yeast2} CAVLAGELSL CSALAAGHLV QSHMTHNRK. ..TNKANELP
QPS.....
HMGRclustalW{      yeast1} CAVLAGELSL CAALAAGHLV QSHMTHNRKP AEPTKPNNLD
ATDI.....
HMGRclustalW{phycomyces} .....
.....
HMGRclustalW{  fusarium} AAVLAGELSL CSALAAGHLV RAHMQHNRSA APSRSTTPGS
SHDARLTGHD
HMGRclustalW{  candida} SIVLSGELSL VSALAAGHLV QSHMQHNRAA AKK.....
.....
HMGRclustalW{dictyoste2} AAVLSGELSL MSALAAGHLV RSHLKHNKRKT EAPAPQADTI
SMTHNLPHSD
HMGRclustalW{wheat1} .....
.....
HMGRclustalW{      rice} GSVVAGRALL LAALASGHLV KSHMMYNRSS KDVAK.....
.....
HMGRclustalW{  corn} GGVLAGELSL LSALAAGQLV KSHMKYNRSS KDVSS.....
.....
HMGRclustalW{wheat3} .....
.....
HMGRclustalW{wheat2} .....
.....
HMGRclustalW{      soybean} GSVLAGELSL MSAIAAGQLV NSHMKYNRSS KDVTK.....
.....
HMGRclustalW{rubbertre3} GSVLAGELSL MSAIAAGQLV NSHMKYNRSA KDVSK.....
.....
HMGRclustalW{rosyperiwi} GSVLAGELSL MSAISAGQLV RSHMKYNRSS KDITN.....
.....
HMGRclustalW{      tomato} GSVLAGELSL MSAISSGQLV NSHMKYNRST KDVTK.....
.....
HMGRclustalW{woodtobacc} GSVLAGELSL MSAISAGQLV KSHMKYNRST KDVTK.....
.....
HMGRclustalW{      potato} GSVLAGELSL MSAISAGQLV KSHMKYNRSI KDISK.....
.....
HMGRclustalW{radish} GAVLAGELSL MSAIAAGQLV RSHMKYNRSS RDISG.....
.....
HMGRclustalW{arabadosis1} GAVLAGELSL MSAIAAGQLV RSHMKYNRSS RDISG.....
.....
HMGRclustalW{cucumismel} GSVLAGELSL MSAIAAGQLV RSHMKYNRSS RDVSK.....
.....
HMGRclustalW{rubbertre2} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS KDVSK.....
.....
HMGRclustalW{rubbertre1} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS KDMSK.....
.....
HMGRclustalW{camptothec} GSVLAGELSL MSAIAAGQLV NSHMKYNRSN KDVTK.....
.....
HMGRclustalW{arabados2} GSVLAGELSL MSAIAAGQLV KSHMKYNRSS RDIGP.....
.....
HMGRclustalW{chineseham} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....

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76/78

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.....
HMGRclustalW{chineseha2} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....
.....
HMGRclustalW{syrianhamst} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....
.....
HMGRclustalW{      rat} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....
.....
HMGRclustalW{      rabbit} GTVMAGELSL MAALAAGHLV KSHMIHNRSK INLQD.....
.....
HMGRclustalW{      human} GTVMAGELSL MAALAAGHLV KSHMIHNRSK INLQD.....
.....
HMGRclustalW{      mouse} GTVMAGELSL MAALAAGHLV RSHMVHNRSK INLQD.....
.....
HMGRclustalW{      xenopus} STVMAGELSL MAALAAGHLV KSHMVHNRSK INLQD.....
.....
HMGRclustalW{sea urchin} ATVMAGELSL MSALAAGHLV KSHMKHNRSA LNIASPLPSI
DEVATHRRSK
HMGRclustalW{ cockroach} GTVLAGELSL MSALAAGHLV KSHMRHNRSS VSTSG.....
.....
HMGRclustalW{drosophila} ATVMAGELSL MAALVNSDLV KSHMRHNRSS IAVNSAN...
.....
HMGRclustalW{dictyostel} SAVMAGELSL MSALSAGHLM KSHLQYNRAK TN.....
.....
HMGRclustalW{schistosom} GTVLAAELSL MAALDTDDL V KAHMHFNRAK QSTNSHSCSH
STTTDNNDNI
HMGRclustalW{archaeoglo} ..GLAQNF AA LRALATEGIQ RGHMELHARN LAIMAGATGD
EVDRVVEIMV
HMGRclustalW{pseudomonas} ..GLAQNLGA MRALATEGIQ RGHMALHARN IAVVAGARGD
EVDWVARQLV

Consensus GTVLAGELSL MSALAAGHLV KSHMK-NRSS KDVSK-----

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* †††

FIG. 32 SS

1101

1152

HMGRclustalW{methanobac}

 HMGRclustalW{methanococ}

 HMGRclustalW{halobacter}

 HMGRclustalW{sulfolobus}

 HMGRclustalW{ yeast2}NKGPPCKT SALL.....

 HMGRclustalW{ yeast1}NRLKDGSV TCIKS.....

 HMGRclustalW{phycomyces}

 HMGRclustalW{ fusarium} QCPRALSVNN VDERRRYSEV KAIDE.....

 HMGRclustalW{ candida}

 HMGRclustalW{dictyoste2}

 HMGRclustalW{wheat1}

 HMGRclustalW{ rice}AAS... ..

 HMGRclustalW{ corn}TTATEK TRQREVDV.. ..

 HMGRclustalW{wheat3}

 HMGRclustalW{wheat2}

 HMGRclustalW{ soybean}IS.... ..

 HMGRclustalW{rubbertre3}ITF... ..

 HMGRclustalW{rosyperiw}IASSQL ESDS.....

 HMGRclustalW{ tomato}ASS... ..

 HMGRclustalW{woodtobacc}ASS... ..

 HMGRclustalW{ potato}

 HMGRclustalW{radish}ATTTT.

 HMGRclustalW{arabadopsis1}ATTTTT TTT.....

 HMGRclustalW{cucumismel}LES... ..

 HMGRclustalW{rubbertre2}AAS... ..

 HMGRclustalW{rubbertre1}AAS... ..

 HMGRclustalW{camptothec}ASS... ..

 HMGRclustalW{arabadops2}SSQVNR

 HMGRclustalW{chineseham}LQGTCTK KSA.....


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HMGRclustalW{chineseha2} ..... LQGTCTK KSA.....
.....
HMGRclustalW{syrianhamst} ..... LQGTCTK KAA.....
.....
HMGRclustalW{      rat} ..... LQGTCTK KAA.....
.....
HMGRclustalW{      rabbit} ..... LEGACTK KAA.....
.....
HMGRclustalW{      human} ..... LQGACTK KTA.....
.....
HMGRclustalW{      mouse} ..... LQGTCTK KAA.....
.....
HMGRclustalW{      xenopus} ..... LPGTCTK KAA.....
.....
HMGRclustalW{sea urchin} SVDFSALKES SAAAPGTCTA NAS.....
.....
HMGRclustalW{cockroach} .....S ...EPSTPAC KS.....
.....
HMGRclustalW{drosophila} .....NP LNVTVSSCST IS.....
.....
HMGRclustalW{dictyostel} .....
.....
HMGRclustalW{schistosom} SNIYDNHNVA LSSKIPVTDN SDIRESVHSL HVKPFVPKSD
LSVNPEISHY TM
HMGRclustalW{archaeoglo} RDGKIRLDYA KEVLRLRS. ....
.....
HMGRclustalW{pseudomonas} EYHDVRADRA VALLKQKRGQ .....
.....

Consensus -----A ---LQGTCTK KAA-----
-----

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Figure 1: ClustalW alignment of forty-three non-redundant HMG-CoA reductase sequences to represent archaeobacterial, eubacterial, fungal, plant and animal groups. The putative functional domains in the alignment marked as described below are based on the three dimensional structure of *Pseudomonas mevalonii* HMGR (Lawrence et al., 1995): boxed-HMGCoA binding domain, light shade-NAD(H) binding domain, underlined consensus- domains involved in catalysis, * underneath consensus and boldface-key histidine residue involved in catalysis. The putative phosphorylation site residues are marked with ‡ and boldface, and are located at the C-terminal region of the protein, adjacent to a highly conserved arginine, marked with † and boldface. Also indicated are the conserved Glu (E), Lys (K), and Asp (D) residues, marked by *E*, *K*, and *D*, respectively. These residues are thought to be critical in catalysis, based on the crystal structure (Tabernero et al., 1999).